Exploring the promotion of creative thinking among secondary school students in India

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Abstract

In India, research on creativity has focused on the construction of tests of creativity and correlational studies of creativity with self-concept, intelligence, personality etc.,. There have been no studies considering the effects of schooling on creativity, teachers' perceptions of creativity or how they could to promote it. This research focused on teachers' views of creativity and their classroom practices, and on students' performance on Tests of Creative Thinking by Baqer Mehdi, their attitude towards curriculum subjects, their occupational choices and their experiences at school.

The sample for the survey included 373 students and 88 teachers drawn from nine Government schools in Andhra Pradesh, India. All the instruments were developed by the researcher and data was collected by means of questionnaires for students and teachers, an scale for assessing teachers encouragement of pupils in the classroom, interviews with teachers and a check-list for head teachers regarding out-of- school activities. To analyse the data, various quantitative and qualitative techniques were applied.

The findings showed that teachers valued creativity, had established criteria for its definition and for identifying creative children. They believed that the development of creativity depended on good teacher-pupil relationships, encouraging experimentation and building self-confidence among the students. Obstacles to the development of creativity included inadequate resources, lack of instructional materials, lack of funds, passive unmotivated students with a tendency to rote learning, pressure to complete the syllabus, preparing students for examinations and teachers' teaching load. They felt that the curriculum was overloaded, inflexible and not suitable to cater for the needs of the wide range of learners. They preferred a child centred curriculum based on activities.

The findings from the student data contributed to the development of a model linking parental factors, the medium of instruction and teacher encouragement. Path analysis showed that out-of- school activities, mother's education, teacher encouragement and mother's income had causal relationships with students' creative thinking. On the basis of the findings practical recommendations have been made for the promotion of creativity among school students.

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Chapter I

Introduction

Although creativity has throughout history engaged the interest of thoughtful people, scientific methods have not been focused on this topic to any great extent until recently. There was only a trickle of research reports on originality and creativeness in the scientific literature for six or seven decades preceding 1950 (Taylor and Barron, 1975, p. xii). As Csikszentmihalyi (1988, p.325) said, "it is customary to date the renewal of interest in creativity among psychologists to Guilford's Presidential address to the American Psychological Association (APA) more than four decades ago" (Guilford, 1950).

Modern society is characterised by rapid change and technological advance. Perhaps never in the history of mankind have so many changes occurred simultaneously and with such acceleration over so broad a spectrum of man's affairs. Changes witnessed during the recent past are seen to represent an even greater acceleration compared to those of previous decades (Raina, 1989, p.43).

Toffler (1981) was interested in studying the effects of these social and cultural changes on various psychological, sociological and educational aspects. He explained the rapidly changing world as a sequence of ***"three waves"*** of civilization. The first wave related to the invention of ***agriculture***. The second wave was the ***Industrial revolution*** and the third wave is the emergence of " the ***electronic age, /electronic cottages/ the electronic world***". This third wave has affected the whole world; particularly the emergence of computers has penetrated everyone's life to a remarkable degree.

Mitchell (1993), explains the major global changes which will continue into the 21st century. He describes the "accelerating rate of change on a global scale", pointing to the rate of change of human invention, the speed of generation of new knowledge, human population growth and the evolution and speed of human transportation (see the graphical pictures in Fryer, 1996, p.6-7, fig.1.1 and 1.2). He argues that the explosion of new knowledge is now so great that most of the things that young children are currently learning will be obsolete by the time they grow up. We have never been in this situation before.

Most social structures, including political systems, have evolved slowly over the centuries, but many of them are no longer appropriate to the modern world. People will

need to be both flexible and resourceful if they are to adjust to the "rapid multidimensional transformation of social, political, economic, demographic and cultural aspects of life" and increasing globalization (Ayman, 1993 cited in Fryer, 1996, p.5).

Creative people will be a valuable resource in the rapid process of change, and especially of technological change, which has gripped our world in recent years. The systems which shape even day-to- day life are becoming so complex that the presence of highly able thinkers, capable of dealing comfortably both with modern technology and also with breathtakingly complex interactions between natural and manmade systems, is rapidly becoming a prerequisite for the maintenance of a way of life which is fit for human beings (McLeod and Cropley, 1989, p.12)

The world is changing so fast that past "truths" often mislead instead of help. No longer is it easy to apply past truths to the problems of the present and the future. Today's world "calls for new approaches to experience, both in acquiring it and in using what we already have" (Stevens, 1963,p. 56*).* As Botkin, Elmandja, & Malitza (1979) have said, "humankind must learn to make new and useful adaptations to the emerging challenges in our global environment". They emphasise that "innovative learning is a necessary means of preparing individuals and societies to act in concert in new situations, especially those that have been, and continue to be, created by humanity itself" (p.12).

It is obviously impossible to prepare today's school children to cope with all the demands they will encounter in their lives (Torrance, 1965, p.12). In this view of the future, traditional responses to the demand for education that are essentially quantitative and knowledge-based are no longer appropriate. It is not enough to supply each child early in life with a store of knowledge to be drawn on from then on. Each individual must be equipped to seize learning opportunities throughout life, both to broaden her or his knowledge, skills and attitudes, and to adapt to a changing, complex and inter-dependent world (UNESCO, 1996, p.85).

If it is to succeed in its tasks, education must be organised around four fundamental types of learning which, throughout a person's life, will be the pillars of knowledge: *learning to know,* that is acquiring the instruments of understanding; *learning to do*, so as to be able to act creatively on one's environment; *learning to live* together, so as to participate and co-operate with other people in all human activities; and *learning to be*, an essential progression which proceeds from the previous three. Of course, these four paths of knowledge all form a whole, because there are many points of contact,

intersection and exchange among them (p.86).

Fryer (1996, p.5) suggests that "to cope with the demands of the future, people will have to be quick – thinking, flexible and imaginative. They will need to be competent in producing effective solutions to unfamiliar problems, in unclear situations. If creativity development were to have the same status in education as it does in the corporate setting, then children would be in a much better position to cope with these kinds of challenges".

As Toffler (1974) argued, "the future requires flexibility and the power to adapt quickly, rather than an ability to respond to behavioural problems in terms of carefully transmitted, rigid conduct codes" (p.193). Those responsible for future policy will need to be skilled in making difficult decisions both wisely and quickly. This may seem far removed from the everyday life of the classroom, but people who can make such decisions may soon be in short supply, unless we educate for the future now (Fryer, 1996, p.5). Thus, the role of the school and teachers is to enable students to function at their maximum capacity and independently.

Moreover, in the light of the 'knowledge explosion' which is taking place, and the consequent need for the ever wider use of human scientific and technological ingenuity, it has become essential that each nation makes the best possible use of all its intellectual resources if it is even to maintain its position in the modern world. It may well be that the nation which emerges from the next few decades in the most desirable position will be the one which does this best (Cropley, 1967,p.19). We are in the middle of a 'brains race' which has made the process of education a matter of increasing importance to communities. To compete with other countries, the state will need to encourage the individual to think creatively about as the yet unforeseen problems of society and the world, in the light of facts and concepts yet to be discovered (Crutchfield, 1967, p.198).

The psychological investigation of creativity may help shed light on how we can find new solutions to old or continuing problems. These call for a more creative type of thinking (Isaksen, Murdock and et al, 1993). Many of these challenges are of the utmost importance because they deal with our survival. Not only is creativity important for our survival as a human race, it can also help us better understand how the individual can reach higher levels of productivity and satisfaction.

By the middle of this century, the importance of creativity in education was in some places beginning to be realised. This was due to the ever-increasing influence of

developing industries and technological advancements. This influence indicated the necessity of preparing individuals who could perform tasks of high quality and could think for themselves in a constructive manner, and take the right decisions when a number of alternatives faced them. It was suggested that the minds of schoolchildren should be developed to cope with these complexities. Creativity in children should be encouraged in order that they may become successful members of society (Chaube and Chaube, 1994, p.383).

As we enter the twenty- first century, children and teachers must be able to progress and succeed in their rapidly changing learning or working environment. They need to learn new techniques, skills and knowledge for adapting to the changing environment throughout their life. Otherwise frustration will develop when they are unable to adjust to the new conditions. Hence, greater attention has to be paid to the quality of education and to preparation for life in a rapidly changing and often technology – dominated world. (UNESCO, 1996, p.126). 'The world is changing in all spheres: scientific and technological, political, economic, social and cultural. So educating the young to meet these challenges has become a priority objective for every society' (*World Education Report'98 UNESCO, 1998, p.16*).

1.1 Creativity in Education

Basic education is an indispensable 'passport to life' that will enable people to choose what they do, to share in building the collective future and to continue to learn (UNESCO, 1996, p.118). 'The time to learn is now the whole lifetime, not just during the period of childhood and youth' (UNECSO, 1998, p.16). As Silberman (1973) said "education should prepare people not just to earn a living but to live a life- a creative, humane, and sensitive life. This means that the schools must provide a liberal, humanizing education" (p.114).

Education is not a preparation for later life; it is an aspect of life itself (p.115). If one of the long-term purposes of education is to prepare children to take their places in our fast-changing society, they will need open, flexible minds and the ability to combine information in new ways (Iverson, 1982, p.694). As Chadha (1990) said, "we will certainly need a different kind of thinking process to be able to live in the world which changes at a much faster pace and with more greater complexity " (p.85). "The climate of future-focused schooling is especially important because of the need to motivate children to make a sustained effort both to attain a better world of tomorrow and to create

a realistic place for themselves in such a world" (Toffler, 1974, p.192).

If education is about educating people for the workplace, then creative skills and creative thinkers are much needed *(Beetlestone, 1998, p.143)*. In many countries in the 1990s there is a growing sense that education is the key to the future, and that the challenges and jobs of tomorrow will require an education of better quality than that which most students receive today (*World Education Report, 1998, p.48*). In India the *Review Committee of NPE'86 (1990, 3.6.0 : p.21)* also emphasised that

"Education should pave the way for enhanced awareness, greater openness, and ability and courage to question, and toughness to search for solutions. In other words, initial education is to be a ***fundamental experience****, a starter for enabling the individual to enter effectively and creatively into the many tasks and challenges of life. It is* ***not a toolbox*** *that s/he would carry through life, in the belief that all eventualities can be dealt with, with the aid of the tools in the box! That is why certificate or degree education can be so misleading (as it often has been) about the real role and purpose of education".*

But in present day educational systems, emphasis has been put on the learning of factual information. To a great extent, passing or failing in an examination depends upon the mastery or memorisation of bits of information that are already known to the instructor (Lowenfeld and Brittain, 1982, p.3; Bowes, 1986, pp.116-118; Chadha, 1990, pp.84-85).

Freeman (1985, p.13) rightly points out:

"Schools which have a name for being 'the best' are often those which have the most examination passes, and which have chosen to emphasize what of their teaching the tests assess. The effect on education of this routine and these predetermined goals are often to diminish the sparkle and excitement of discovery in learning, which is so vital to creative endeavour. However, gifted children may well do either more than the teacher expects, or something quite different, and thus put paid to the best laid educational plans".

According to Alencar, (1993) "Education which emphasises reproduction of existing knowledge is a strongly negative influence on creative thinking" (p.93). Bloom (1958) pessimistically says, "There is some reason to believe that the educational system as it prevails today can reduce originality and creativity. This negative effect on creativity is most marked when examinations, instructional materials and instructional processes all emphasise learning by rote and when goals of teachers, parents and children are primarily centred on getting over one examination hurdle after another".

1.2.0 Why creative thinking is essential?

Creative expression is essential for leading a happy life. Since the dawn of civilization, man has experienced the greatest pleasure and bliss by adopting creative

values in his life. In addition the future of our civilization depends upon the quality of the creative imagination of the next generation *(Torrance, 1962b, p.33)*. According to Torrance in teaching all students should be provided with opportunities for creative expression, so that they are turned into contented, balanced and happy citizens. Torrance (1965, p.10) outlines that "creative thinking is indeed a powerful force. It has given us the alphabet, printing, radio, television, computers, spacecraft, great art, architecture, music, and literature. It has given us our great advances in scientific discovery and medicine. It has also given us war, plunder, crime, and the smashed atom".

Creativity is essentially a human phenomenon. It is a process in man which helps him to achieve dignity and meaning in life. As *Bruner (1962)* argues, the 'creative act may bring man to a new dignity' (p.2), Toynbee (1964) considers creativity as man's greatest asset. He points out that "to give a fair chance to potential creativity is a matter of life and death for any society. The creative power planted in a minority of mankind has to do duty for all the marvellous physical assets that are built into every specimen of Man's non-human, fellow creatures"(p.4). It is essential that "the nation should become concerned about all of its potential human resources, especially aware of the waste and loss of such resources in each person" *(Taylor, 1978, p.39)*. It has been observed by manpower specialists that countries may not be able to sustain economic growth unless all the reserves of the talent in the population are actively sought out and developed through educational channels *(Raina, 1985)*.

Creativity enormously affects the scientific progress and commercial life of the nations. Taylor (1964, p.2) realised that "creative acts affect enormously not only scientific progress, but society in general. Those nations who learn best how to identify, develop, and encourage the creative potential in their people may find themselves in very advantageous positions". *Floistad (1993,p.206)* argues that the overall purpose of creativity is to improve the quality of life in the society, local or global, in which it operates. As Mcleod and Cropley (1989, p.12) said, if society fails to make the most of this one human asset, or if, worse still, it perversely sets itself to stifle it, man is throwing away his birthright of being lord of creation and is condemning himself to be, instead, the least effective species on the face of this planet" (p.4). If society is not only to survive but to continue to enjoy a high quality of life, vast resources of giftedness need to be mobilized in the arts, in Social Sciences, in Philosophy, etc.

De Bono (1992) outlines how creativity can be used in practical ways. ***1) for improvement***[1]***:*** -finding a better way of doing something ***2) for problem solving*** -to find best solutions.***3) for the future***-the future always requires thinking foresee the consequences of an action and to generate further alternatives for consideration ***4) motivation-*** creativity makes people interested in what they are doing. These are all-important considerations for the development of adaptability in a changing environment. In addition to the benefits to society there are many advantages to the individual in promoting creativity. According to *Torrance (1962a, pp.2-7; 1962b, pp.32-33)* the importance of guiding the growth of creative thinking abilities among children is to ensure their personality development and mental health, fully functioning personalities, educational achievement, vocational success, and social importance.

Cropley (1978, 1982a)[2] similarly advances a number of arguments of an essentially humanistic nature for the promotion of creativity. It is important because it:

1. Makes school learning more effective. Cognitive process and personal and motivational characteristics, such as those which will be outlined shortly, greatly enhance, among other things, "learning to learn".
2.Increases the ability of people to cope with the social and scientific changes which the next 50 years will bring -flexibility, originality, and the readiness to try something new are becoming, and will become even more, important.
3. Promotes the spiritual well-being of people - the ability and readiness to deal in an open and flexible way with life situations is vital to mental health.
4. Protects our human dignity in the age of the computer. It is not routine, programmable thinking which will confirm our unique position as human beings, but creative processes and products.
5. Offers new perspectives for making equality of opportunity a reality- an expanding concept of excellence, which takes account of hitherto neglected areas and also emphasizes the importance of non-cognitive aspects, opens up new possibilities.

1.3.0 A brief Indian Educational Scenario

The Indian constitution which come into force on 26 January 1950 provides the basic legal frame work for governance. India, a union of states, is a parliamentary democracy with a federal structure. It comprises 25 states and 7 union territories. The constitution makes an elaborate distribution of governmental powers – legislative, administrative and financial – between the Union and the states [3]. Within a state there is generally a four-tier structure of administration: (1) region/zone/range, (2) district, (3) *taluka*/block/*mandal*, and (4) villages. Urban areas have local bodies such as municipalities and municipal corporations. In the state of Andhra Pradesh (where the

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[1]The western notion of Improvement has always been considered with removing defects, overcoming problems, putting faults right.

2 Cited in McLeod and Cropley (1989, p.60)

3 Government of India, Department of Education (1993).

study was carried out), the system of *Panchayatiraj* operates, generally with a three-tier structure of local self-government at the village (*Grampanchayati*), Mandal (or Block) (Mandal Praja Parishad) and district (Zilla Praja Parishad) levels.

India is the second most populated country in the world, with 846.30 million people, of whom males and females were 439.23 and 407.07 millions respectively (1991 census). Any understanding of Indian society has to begin with an appraisal of its diversity. The diversity is a product both of historical as well as geographical factors. India has been a meeting ground of races and cultures from very ancient times. The Indian population comprises people belonging to variety of races, speaking a multitude of tongues, and professing virtually all the major world religions. This diversity reminds one of the extraordinary complexity and uniqueness of Indian society [4].

The Directive Principle contained in Article 45 of the constitution enjoins that "the state shall endeavour to provide, within a period of ten years from the commencement of this constitution (1950), for *free* and *compulsory* education for all children until they complete the age of fourteen years." Article 350-A lays down that " it shall be the endeavour of every state and of every local authority within the state to provide adequate facilities for instruction in the mother-tongue at the primary stage of education for children belonging to linguistic minority groups".

The objective of incorporating education in the Concurrent List was to facilitate the evolution of all-India policies in the field of education. The union government has set up a number of resource institutions at the national level (eg. NCERT, NIEPA, CIIL, CIEFL) for assisting and advising the union and the state governments, formulation and implementing the policies and programmes in the field of education.

1.3.1 Organisation and structure of the education system in India and Andhra Pradesh

Decisions regarding the organisation and structure of education are largely the concern of the states. Each state independently determines the educational structures to be adopted. As envisaged by NPE 1968, a broadly uniform educational pattern (10+2+3) has emerged all over the country, comprising ten years of basic school education followed by two years of higher secondary (intermediate) education and three years of education for obtaining the first university degree.

A child is normally admitted to class I at the age of six and is expected to

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4 Raina (1993, p 305).

complete class V at the age of +11 years, class VIII at the age of +14 years, class X at the age of +16 years and class XII (Intermediate) at the age of +18 years. The educational structure in India with levels and duration of each level and the normal age of entry to each level is given in the Appendix-A1.

The National Policy on Education (NPE) 1986, is a landmark in Indian education. Based on an in-depth review of the Indian educational system and evolved through a consensual process, it provides a comprehensive framework to guide the development of education. The two major schemes of the Department of Education (India), Operation Black Board (OBB-1986) and District Institute of Education and Training (DIETs-1988) have dramatically changed the school education scenario. The project, popular in India and abroad, called the ' Andhra Pradesh Primary Education Project (APPEP)' was implemented in two phases with the financial assistance of ODA of UK since 1983 (See Appendix-A1). A subsequent project called the District Primary Education Programme (DPEP) has been launched and similar participatory structures have been setup at district level.

1.4.0 Need for the present Investigation:

In view of the importance of creativity in all walks of life, including educational settings, there is a need to explore the field scientifically and with greater rigour. Despite the increase in recent research, much is not known and still requires investigation.

Craft and Dugal (1997) have argued that "the end of the twentieth century is witnessing a massive shift in attitudes to and the importance of, creativity and imagination in our everyday lives and domains of knowledge. We need transformation, at both a personal and a system level. The fragmentary nature of our post-modern existence means that in many ways the mores and shared traditions are mixed and confused. Multiple possibilities exist for us in adopting, for example, spiritual, social, economic and technological identities and actions. In many areas we have no models to follow and have to work out what the possibilities are as we go along"(p.104).

The issue of the development of creativity among school children is challenging to teachers, schools, and educational administrators as well as for researchers in the field of education and psychology. Often in many countries of the world, teachers have been criticised and schools blamed for not providing the necessary environment for nurturing creativity among students. The emphasis of the education system is generally more focused on examination results rather than the actual process of learning (Lownfeld and

Brittain, 1982; Freeman, 1985; Bowes 1986; Raina, 1989, Chadha, 1990; Alencar, 1993).

As far as India is concerned many educational researchers, Education Commissions and Committees have criticised educational practices which have typically failed to foster creativity among students and ignored the development of imagination and independent thinking. As long ago as 1952-53, the Secondary Education Commission (1952-53) in India commented

"this education was too bookish and mechanical, stereotyped and rigidly uniform and did not cater to the different aptitudes of pupil or to pupils of different aptitudes. Nor did it develop those basic qualities of discipline, co-operation and leadership which were calculated to make them function as useful citizens. The stress of examinations, the overcrowded syllabus, the methods of teaching and the lack of proper material amenities tended to make education a burden rather than a joyous experience to the youthful mind." (P.20)

Later in the 1960s, the Indian Education Commission (1964-66: 9.5: P 240) reported:

"A dearth of component and trained manpower is now felt in nearly every branch of national life, and is probably one of the biggest bottlenecks to progress". Further, the Commission recommended that 'sustained and energetic' research is needed in recognition of talent and its development. Because "talent is the most valuable asset a country can have", the search for talent must be a continuous process and has to be taken up at all stages, particularly at the secondary stage which is the most crucial.

A document "Challenge of education –a policy perspective" (The Government of India, 1985, 1.29,pp 11-12) stated:

"It has been noticed that the vast majority of students are not exposed to challenges which would develop their potential for creativity and innovation because the whole system of education is characterised by class work and examinations which emphasize rote learning and repetitive exercises. Undoubtedly, this will require the overhaul of pedagogic methodology as well as the curricula and textual materials. These, however, will not be enough. Something will have to be done to change the orientation, work-ethic, knowledge and skills of teachers, who will have to function much more creatively in a learning rather than a teaching environment, in which they will have to struggle continuously with new ideas as well as new technologies".

More recently, the Review Committee of NPE'86 (1990, p. v), expressed dissatisfaction with the present education system in India; it said,

"our formal system remains confined to the four walls of a school or college. It is tied down to textbooks and examinations. Even then the books are unreadable and the examinations totally unreliable. The courses of study are so framed that the students are not equipped with any productive skills. Whatever education they receive cuts them off from their natural and social environment. They become aliens to their own community. They lose faith in life itself".

Addressing an International Conference at Delhi (India) in January, 1986 (cited in Hussain, 1988), Dr. Raja Ramanna, Chairman of the Atomic Energy Commission, cast doubt on the contribution of formal education to creative development in children. He rightly posed the question: *Are children being exposed to too much knowledge in the rapid advancing world today at the cost of stunting their creativity?* Education must not only aim at intellectual development but also at creative expression.

Similar views were expressed by the vice-chancellor of Bombay University, an eminent sociologist (Gore,1985 cited in Raina, 1993, p.309) while addressing the 60th Annual Meeting of the Association of Indian universities. "It is my submission that for the vast majority of the students and teachers involved in it, our education system does not provide a creative experience". He further elaborates:

> "Much of education at school and college level has tended to emphasize the printed word and has failed to provide for the interaction between the student and different aspects of his environment which would make those words meaningful. Children learn poetry and memorise the words without the imagery communicating itself to them. A boy studying even in a rural school will learn about the major crops of the state from his geography book, but will not relate the names of the crops to what he sees around him. For some reason the link between the printed word and one's own experience is not established so that there is neither a sense of discovery and affirmation or questioning of what has been said in the book. Our education has tended to emphasize examinations rather than learning or teaching".

There seems to be a gap between intentions and practices. One of the stated objectives of primary education in India, outlined by the National Council for Educational Research and Training (NCERT, 1975), is that "the child should be able to express itself freely in creative activities and should acquire habits of self learning". But the present educational system and its unrealistic syllabi are so taxing to growing children that their creative imagination is suppressed and blocked most of the time. The whole focus of teaching learning practices is on examinations and grades, with added emphasis on covering a large amount of the syllabus; teaching is mostly done to deliver rather than to derive meaning (Raina, 1989, p.104). A lot of emphasis is placed on convergent thinking at the cost of divergent thinking. It is difficult to speculate on the use of textbooks or the other teaching practices followed, but generally they do not appear to develop creativity.

A student has to carry a school bag, containing textbooks, exercise books, class work and rough workbook (in the class), and home workbooks for the whole day (eight periods[5]). In addition s/he has to carry a water bottle, lunch box and raincoat or umbrella. Altogether a student carries about 8-10 kgs from home to school and back again daily[6]. "Their school bag is becoming bulkier every day and every three months it has to be replaced by a bigger bag" (Srivastava, 1994, p.15). "This problem is often picturesquely presented as creating hunchbacks out of the school children and as relieving the children of the joys of learning – literally making the learning process burdensome" (Review Committee of NPE-1986 (1990, p.298).

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5 Three languages (English, Hindi and Telugu), Mathematics, Sciences (Bio + Physical), Social Studies (Geography, History, Civics etc.,), General Knowledge, Moral studies or SUPW or Games.
6 See Appendix Picture Nos.1-3

As the courses are extensive in their coverage, so the homework is proportionately heavy. After coming home children are busy studying and cannot go to the playgrounds. Even if they do play, their parents pressure them to come home and study so that they can get higher marks in their frequent class tests. The student is constantly under pressure and being forced to compete even after the school day (Raina, 1989, p.103). "Leisure has become a highly scarce commodity in the child's, especially the urban child's, life. The child's innate nature and capacities have no opportunity to find expression in a daily routine which permits no time to play, to enjoy simple pleasures, and to explore the world" (NAC[7], 1993). Many committees and commissions have made numerous recommendations to reduce the academic burden on students. But nothing has been implemented.

In addition, in India, research on creativity has mainly focussed on the construction of tests of creativity and correlational studies of creativity with self-concept, intelligence, personality and achievement motivation. There have been no in-depth studies considering the effects of schooling on creativity, or of teachers' perceptions of creativity or how to promote it. A study of teachers' views and attitudes in India towards the promotion of creativity is important to provide evidence to assist in promoting change. A number of comparative studies of government and private schools have reported the performance of private schools students as higher than government school students in creative thinking ability. However, none of them addressed the reasons why there was such underachievement in government schools.

This research is designed to answer some of the questions arising in relation to creativity in education. In India, particularly in government schools where the majority of the urban and rural poor students study, facilities are poor compared to the private schools. Private schools collect huge amounts of fees and donations from parents to help them survive in the competitive world. Studying in a government school is not a curse, pupils should not be victimised and they should be provided with all the facilities necessary on a par with private schools.

Nowadays the 'privatisation' of schooling encourages and gives licence to the privileged classes. This is not a problem only in India. It is becoming a world-wide issue and challenge for governments or community schools every where. Poor people cannot afford to go to private schools. Nevertheless they are entitled to quality education.

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7 National Advisory Committee headed by Prof. Yaspal, 1993.

The observations of the Indian Education Commission (1964-66) are in this context.

> At the primary stage, the free schools to which the masses send their children are maintained by government and local authorities and are generally of poor quality. Some of the private schools are, on the whole, definitely better; but since many of them charge high fees, they are availed of only by the middle and the higher classes. The children of the mass are compelled to receive sub-standard education and, as the programme of scholarships is not very large, sometimes even the ablest among them are unable to find access to such good schools as exist, while the economically privileged parents are able to 'buy' good education for their children. This is bad not only for the children of the poor but also for the children from the rich and privileged groups.
>
> At the secondary stage, a large proportion of the good schools are private but many of them also charge high fees which are normally beyond the means of any but the top 10% of the people, though some of the middle class parents make great sacrifices to send their children to them. There is thus segregation in education itself-the minority of private, fee-charging, better schools meeting the needs of the upper classes and the vast bulk of free, publicly maintained, but poor schools being utilised by the rest. What is worse, this segregation is increasing and tending to widen the gulf between the classes and the masses (1.36 and 1.37: ***p. 10).***

Further, the commission suggested that " if these evils are to be eliminated and the educational system is to become a powerful instrument of national development in general, and social and national integration in particular, we must move towards the goal of a common school system of public education

-which will be open to all children irrespective of social, economic and other differences;
- where access to good education will depend, not on wealth or class, but on talent;
-which will maintain adequate standards in all schools and provide at least a reasonable proportion of quality instruction;
-in which no tuition fees will be charged and
-which would meet the needs of the average parent so that he would not ordinarily feel the need to send his children to expensive schools outside the system (1.38: P.10).

More recently the Review Committee of NPE'86 (1990, p.92) expressed the dissatisfied view that " in government schools, the quality of education has remained poor". Public schools, privately managed English-medium schools, schools charging capitation fees and those having expensive coaching classes have proliferated.

Article 46 of the Indian constitution deals with the special care of the economic and educational interests of the under-privileged sections of the community. The article states:

> *"the state shall promote with special care the educational and economic interests of the weaker sections of the people, and in particular, of the Scheduled Castes and the Scheduled Tribes, and shall protect them from social injustice and all forms of exploitation".*

Are government schools really doing justice to children who come from weaker sections? Do they take any measures to promote creativity? Why do they fail to promote creativity among students on a par with private schools? Are the facilities of the school slacking in some way? Are the students, teachers or parents inadequate in some way?

The findings of this research will contribute to our understanding of creativity in India. This research will help teachers particularly, but educational administrators and planners, and parents as well. The findings may be useful in suggesting desirable changes which may be brought about in the learning environment to create a conducive climate in classrooms, develop positive attitudes among the teachers, and suggest remedies for the present problems.

1.5.0 Aims of the present study

The present study aims to explore the conditions for facilitating creativity prevailing in government schools. The main focus of this research firstly, is ***to explore teachers' views of creativity and how it can be developed.*** This includes teachers' knowledge and understanding of creative thinking, the support perceived by teachers to be needed improve their knowledge and understanding, teachers' definitions of creative thinking, the assessment criteria they adopt for identifying the creative child in the classroom, the perceived importance of creativity in schools, the factors which they believe assist and affect students creativity, their attitudes towards the encouragement of creativity, and suggestions made by teachers for promoting creativity in government schools.

Secondly, the aim is to study the relationship between creative thinking[8] and the ***students' personal background variables*** (sex, age) and ***parental background*** (education, occupation and income). Thirdly, to explore the relation between measures of creativity and ***cognitive and motivational variables*** including students' interests (as shown by liking and disliking school subjects and career aspirations), perceptions (about their teachers) and classroom experiences (good and bad). Fourthly, to study the relationship between measures of creativity and ***organisational or school variables*** including type of school (gender), medium of instruction, activities organised by schools in order to promote creativity in children. Finally, the study enquires whether an ***exploratory model*** can be developed to describe the relationships between students' personal background variables, cognitive and motivational variables and organisational or school variables.

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8 ❶ Verbal test of creative thinking as measured by Prof. Baqer Mehdi
❷ Non-verbal test of creative thinking as measured by Prof. Baqer Mehdi
❸ The total scores (standardised scores) of the above two tests

The thesis will explore these issues within the following structure.

1.6.0. A brief resume of the succeeding chapters.

Chapter II deals with conceptual understandings of the term 'creativity' in the light of the various theories which have been propounded. The controversies concerning the nature of the relationship between creativity and intelligence are explored.

Chapters III, IV and V review the literature in the field of creativity from which is derived a conceptual framework. Chapter III deals with the identification of the creative child, the measurement of creativity at school level, creativity-related variables e.g. age, grade, sex, SES, type of school. Chapter IV discusses the role of the school, curricular and extra-curricular activities, and the environment needed to promote creativity. Chapter V throws light on the role of the teacher, how a teacher can encourage creativity and teachers' views and attitudes towards creativity.

Chapter VI describes the design and development of the research instruments, and the translation procedures. Chapter VII describes the pilot work carried out, item analysis, scoring procedures, analysis of pilot data and the trends of the results.

In Chapter VIII the research design and methodology are described. This chapter discusses the research framework, methodology, sample selection, procedures followed in data collection, validity and reliability of the instruments and the statistical techniques used for the data analysis.

Chapters IX to XI report the findings. Chapter IX reports the analysis of the teachers' questionnaire and interviews. Chapter X reports the nature of the distribution of creativity scores and analysis of students' creativity test scores. The analysis of data is mainly based on the background, organisational and cognitive and motivational variables. Chapter XI deals with the analysis of the teachers' encouragement scale (TES), the schools' activities data and the exploratory model of the correlates of creative thinking.

Finally, Chapter XII contains a brief summary of the findings, the relationship of the findings with earlier literature, and their educational implications, and discusses the limitations of the study and possibilities for further research.

Chapter-II

Creativity-A theoretical approaches

2.1.0 Introduction

In this chapter, the great diversity of definitions of the term 'creativity' and variety of meanings attached to it will be analysed. Various theories of creativity have been proposed. Some have undergone empirical validation; others have not. The relevant theoretical approaches are presented in this chapter within broad categories. This chapter will also provide a brief overview of research on convergent and divergent thinking, lateral thinking and correlational studies between creativity and intelligence.

2.2.0 Definition of Creativity

Most of us have been conditioned to regard creativity as something mysterious - a rare gift possessed by very few people. We use the term 'creativity' in relation to the arts and to those strokes of genius that produce an invention or major scientific discovery. Of course, this way of looking at creativity may be valid, but creativity can be reflected through almost all human actions. Everyone during their everyday lives may make changes to things they produce, for example dress designers, pottery makers, cooks, carpenters, goldsmiths etc., All are creating something. Their creative energies are being manifested in different ways and styles[1]. In fact, creativity makes an object or activity better, richer, more productive, fruitful and aesthetically satisfying[2].

Creativity is complex in nature. It is difficult to understand it by adopting one single definition. Different viewpoints have been put forward to explain the concept, emphasising different aspects of creativity. By and large, psychologists seem to agree that creativity involves the ability to produce original ideas and to perceive new relationships among unrelated things. However, it does not involve just an ability to produce original ideas. Creativity is multifaceted[3].

Repucci(1960)[4] reviewed fifty to sixty definitions and classified them into six major groups or classes. These groups are not mutually exclusive, since each definition may contain elements which fall into different classes. The first class of definitions, labelled as *Gestalt or Perception* types, has a major emphasis on the recombination of ideas or restructuring. The second is *end product or innovation oriented* – the result being

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[1] Phyrooj (1988) , p.2
[2] Gulati (1995), p.35
3 Ibid p.16
4 Cited in Taylor, 1988, pp. 118-119.

something new, a product, an idea or an object. The third class is *Aesthetic or Expressive*- with the emphasis upon self-expression; the fourth group of definitions is characterised as *Psychoanalytic or Dynamic*. These define creativity in terms of certain interactional strength ratios of the id, ego and superego. A fifth class, called *Solution thinking*, emphasises the thinking process rather than the actual solution of the problem. The last class is labelled *Varia* simply because there is no easy way of characterising these definitions.

Creativity research, rather than having one universal definition, has used a variety of definitions, theories and assessment approaches. Despite the apparent confusion and contradictions resulting from the use of multiple definitions, some degree of agreement has been reached[5].

Welsch(1980)[6] reviewed 22 definitions of creativity and proposed the following definition

Creativity is the process of generating unique products by transformation of existing products. These products, tangible and intangible, must be unique only to the creator, and must meet the criteria of purpose and value established by the creator.

A widely known and accepted concept of creativity, called the 'Four P' model, is based on the assumption that creativity can be defined as a holistic multi-dimensional concept. *Rhodes (1961, p.307)* developed a framework for a unifying approach to creativity; he collected 56 different definitions (40 of creativity and 16 of imagination) and observed that these definitions overlapped and intertwined, forming four strands. These strands were the ***creative person*** (clustered around personality-related traits and the mental ability of the person to create something new), the ***creative process*** (the function of the mind in creating ideas in the creative person. e.g. searching, combining and synthesising), the ***creative product*** (the outcome or product being original, unique, valuable and novel), and the ***creative press*** (or environment) (the influence of the ecological press on the person and upon his mental processes and outcomes). Similarly, Mooney (1963, p.331) hypothesised a conceptual model for integrating four main approaches in the identification of creative talent: 1) the environment, 2) the person, 3) the process, and 4) the product (p.331). Further, *Isaksen (1987)* extended Rhodes's approach when he introduced the concept of the *"4 Ps" (Creative Person, Creative Process, Creative Product and Creative Press (environment))* of creativity as an overlapping Venn diagram (see fig-2.1).

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5 Isaksen, Murdock and et al, 1993, pp.18-19.
6 Ibid p.18

Firestien, (1993,p.262) argues that when investigating the creative product, it is important to understand that the creative product, the artefact, the outcome of a creative endeavour, does not occur in a vacuum. Researchers artificially isolate the creative product to study it. But people work with processes and in environments that can either be supportive or non-supportive of their creative endeavours. The results of their work-the products-are introduced to environments (press) and subsequently change those environments.

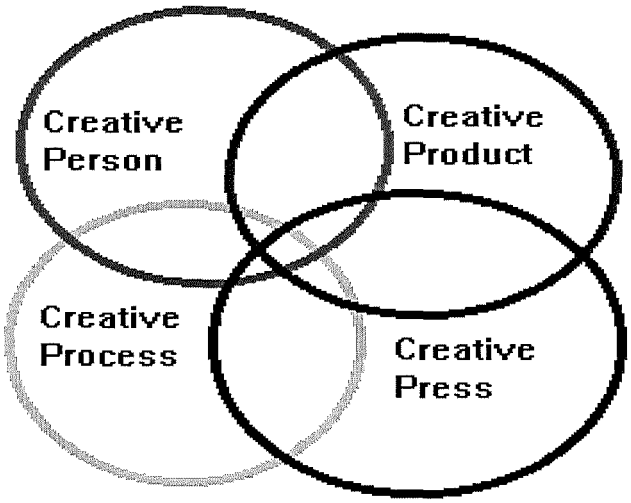

Figure 2.1 : 4 Ps (Person, Process, Product and Press)

Source: Firestien, 1993, p.262

2.2.1 Creative persons

Some personality-oriented psychologists conceive creativity in terms of the person. Considerations of the creative person typically fall into three general categories: (A) cognitive characteristics (B) personality and motivational qualities and (C) special events or, experiences during one's development *(Tardif & Sternberg, 1988)*. It is generally acknowledged that people are creative within particular domains of endeavour, even though those who are creative in different domains may share common traits. Thus, one may be a creative biologist, but a very uncreative novelist, or vice versa. Domain specificity is a major consideration when describing creative persons *(Sternberg,1988; Walberg,1988)*. It relates to other characteristics such as using one's existing knowledge in the domain as a base to create new ideas, being alert to novelty, and finding gaps in domain knowledge *(Sternberg 1988; Torrance,1966 ; Walberg,1983)*. Although it is generally agreed that creative individuals are creative within limited domains, various explanations have been offered for why individuals differ in their propensities toward and abilities in their domains of speciality.

(A) The cognitive characteristics that are shared by creative people, regardless of domain, can be grouped into three sets: the traits, abilities, and processing styles that creative individuals use and possess *(Tardif and Sternberg, 1988).* (i) Traits that are commonly said to be associated with creative individuals include relatively high intelligence, originality, articulateness and verbal fluency, and a good imagination. (ii) Cognitive abilities include the ability to think metaphorically, flexibility and skill in making decisions, independence of judgement, coping well with novelty, logical thinking skills, internal visualisation, the ability to escape perceptual sets and entrenchment in particular ways of thinking, and finding order in chaos. (iii) the approach to problems (i.e., style) includes using wide categories and images, a preference for non-verbal communication, building new structures, questioning norms and assumptions in the domain, being alert to novelty and gaps in knowledge, and using existing knowledge as a base for new ideas.

B) The most commonly mentioned personality or motivational characteristics are a willingness to confront hostility and take intellectual risks, being open to new experiences, curiosity and growth *(Barron, 1988, Torrance,1988),* discipline and commitment to one's work, high intrinsic motivation, being task-focused, a high degree of self-organisation and competence in meeting optimal challenges *(Hennessey & Amabile,1988).*

Some additional characteristics mentioned less often include tolerance for ambiguity, a tendency to play with ideas, valuing originality and creativity *(Walberg,1988),* unconventionality in behaviour, experiencing deep emotions, intuitiveness, seeking interesting situations and some degree of conflict between self-criticism and self-confidence *(Barron, 1988).*

Aspects of the characteristics of a creative person can have an impact on others in their immediate surroundings. However, Feldman (1988) and Gardner (1988) both suggest that what distinguishes creative individuals is their lack of fit to their environment. They are often also seen to be withdrawn, reflective and preoccupied, avoiding interpersonal contact and social demands.

C) The study of creative individual's lives has revealed that they often have features of their developmental history in common. Environmental factors which may be important are being first-born *(Simonton, 1987),* losing one or both parents early in life, experiencing unusual situations and being reared in a rich and stimulating home environment which provides diverse experiences. Creative children tend to be happier with books than with

people, like school, do well, and learn outside of class for a large part of their education *(Walberg, 1988).*

2.2.2 Creativity as Product:

Creativity has also been defined in terms of products. Product-oriented psychologists give primary importance to the product. If the product is considered creative, then the person who made it may be considered creative. The products of creativity can include behaviours, performances, ideas, things and other kinds of output, through any channel or type of expression *(Taylor, 1988,p.104). Parnes (1966)* defines creative behaviour as that 'which demonstrates both uniqueness and value in its product'

Creative products can be solutions to problems, responses to creativity tests, or explanations for phenomena. The products are novel- they are not imitations, nor are they mass-produced *(Perkins, 1988; Taylor, 1988; Torrance, 1988).* A creative act is one in which 'something new is produced- an idea or an object including a new form of arrangement of old elements. The new creation must contribute to the solution of some problem' *(Wilson, Guilford and Christenson, 1974, p.208*). Features that may be more relevant to scientific creativity and creative problem-solving are that the products should show sensitivity to gaps in existing knowledge *(Langley & Jones, 1988; Torrance, 1988).*

Guilford (1957) suggested that an individual's potential for being creative related to his or her readiness to produce novel ideas. This includes the production of old ideas in new forms. This readiness depends upon information in memory and appropriate dispositions to enable him or her to make use of it in new ways (pp.69-95). Many writers see creativity as the ability to bring something new into existence (*Barron, 1969; Stein, 1960; May, 1959; Stagner and Karwoski, 1973; Dehaan and Havighurst, 1957; Drevdahl, 1956; Maslow, 1959; Johnson-Laird, 1993).*

Those who subscribe to analytical creativity, however, feel that knowledge of the creative behaviours within the process of creating an end product is vital to future productivity. *Ghiselin (1952)* proclaims that "insight into the processes of invention can increase the efficiency of almost any developed and active intelligence (p.11)".

2.2.2.1 Criteria for establishing creativity:

The judgement of end products raises many questions of major importance. Should the decisions made by teachers judge students against themselves and their previous productivity, or are the norms of society applied in evaluating the worth of their efforts? (Shallcross, 1981, p.9).

Where an end product is concerned, for instance, how will teachers judge whether

or not it is creative? There are two opposing schools of thought. One says that if it is new to the person who has produced it, it is creative. That in spite of the fact that the product has existed before, having been created by someone else or by numerous others. It is new to this individual at this time in his or her life and therefore is a creative product. The opposing school maintains that in order for an end product to be considered creative, it must not have existed before and it must meet particular criteria that will set it apart from anything that has been produced previously. These criteria include novelty or unusualness, appropriateness to the context in which it is placed, and transformation of materials or ideas that overcome conventional constraints. End products can also vary greatly as to intent. Two extremes, for example, are products intended to serve a functional purpose and those that are aesthetic expressions *(eg Shallcross, 1981, p.8).*

According to *Johnson-Laird (1993)* creative thinking must not be produced by recall from memory, rote computation or any other simple deterministic process.

Gowan, Demos and Torrance (1967,p.44) define human problem-solving as creative to the extent that one or more of the following conditions are satisfied: first, if the product of the thinking has novelty and value either for the thinker or for his society; second, if the thinking is unconventional, in the sense that it requires modification or rejection of previously-accepted ideas. Third, we call thinking creative if it requires high motivation and persistence, taking place either over a considerable span of time or at a high intensity. And finally, we tend to call thinking creative if it deals with or solves a problem which, initially, as it was posed, was vague and ill-defined, so that part of the task of the creative thinker was to formulate the problem itself, to give it structure.

Torrance (1965, p.6) outlines criteria indicating a lack of novelty or a lack of invention: 1. changes requiring only mechanical skill; 2. change in size; 3.duplication of parts of a device; 4. omission of an element of a device or step of a method; 5. reversal of parts; 6. change of material; 7. use of an old process or method to a different but analogous object or material; 8. making a device adjustable; 9. change in an element of an old combination; 10. aggregation of elements.

Besemer and Treffinger(1981) reviewed the criteria of creativity set out in the literature (about 125) and classified them into three general dimensions: 1. Novelty; this refers to the newness of the product in terms of processes, techniques, materials, concepts and so on. The product would be judged for originality and germinal and transformational qualities. 2. Resolution – includes criteria which pertain to the correctness or rightness of the solution to the problematic situation. The product would be judged for logical,

appropriate, adequate, useful and valuable. 3. Elaboration and synthesis – the degree to which the product combines unlike elements into a refined developed, coherent whole, statement or unit. This includes the notions of expressiveness, complexity, being well-crafted, attractiveness, sense of wholeness or completeness and elegance.

The criteria for establishing creativity are multi-dimensional and appear to depend not only on the end-product but also on the process involved (*Murray, 1959; Parnes, 1967; Stein, 1974&1975; Brunnelle, 1970; Arnold, 1963).*

2.2.3 Creativity as Process:

The orientation of process-oriented psychologists is towards understanding the process of thinking that leads to the emergence of creative products. If the creative process is understood, then efforts can be made to develop such thinking among children. *Rogers (1954, p.139; 1959, p.71)* defined the creative process "as the emergence in action of a novel relational product, growing out of the uniqueness of the individual on the one hand, and the materials, events, people or circumstances of his life on the other". According to Ghiselin (1952), creativity is a process of change and development in the psychic life of an individual leading to invention (p.12-13).

Mackinnon (1962, p.485) argues that creativity is "a process extended in time and characterised by originality, adaptiveness and realisation" and fulfils at least three conditions[7]. *Hallman(1963)* has analysed the creative act into five major components: (1) it is a whole act, a unitary instance of behaviour; (2) it terminates in the production of objects or of forms of living which are distinctive; (3) it evolves out of certain mental process; (4) it co-varies with specific personality transformation and (5) it occurs within a particular kind of environment (p.17).

A number of authors outline steps in creative thinking. For instance, *Graham Walls (1926)* proposes four steps: *preparation* (gathering information), *incubation* (allows solutions, ideas to mature), *illumination* (emerging of solutions, ideas etc), and *verification* (testing the solutions, ideas etc., and adapting them to other situations). *Osborn (1948)* proposes five stages which are similar to those of Walls. 1. *orientation* (picking out the problem); 2. *preparation* (gathering relevant material the organisation effort); 3. *analysis and Ideation* (seeking possible solutions); 4. *incubation* (a time lag for the mind to

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7 (1) It is novel or at the very least statistically infrequent. But novelty and originality of thought or action, while a necessary aspect of creativity, is not sufficient. If a response is to lay claim to being a part of the creative process, it must to some extent be adaptive to, or of, reality. (2) A creative process must serve to solve a problem, fit a situation or accomplish some recognisable goal. And (3) true creativeness involves a sustaining of the original insight, an evaluation and elaboration of it, a developing of it to the full.

synthesise the problem and solution); and 5. *evaluation* (putting the pieces together and verifying the solutions through further testing for evaluation). *Rossman (1931)* proposes seven steps in creative activity.1. A need or difficulty is observed. 2. The problem is formulated. 3. Available information is surveyed. 4. Solutions are formulated. 5. Solutions are critically examined 6. New ideas are formulated and 7. The new ideas are tested.

The differences in these descriptions are largely maters of detail. All describe a similar overall progression.

"Creative thinking", according to *Torrance (1962),* " is the process of sensing gaps or disturbing, missing elements, forming ideas or hypotheses concerning them; and testing these hypotheses". Subsequently, *Torrance (1966) and Torrance and Myers (1970)* have defined creativity as "....a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies and so on; bring together available information; defining the difficulty or identifying the missing element; searching for solutions; making guesses or formulating hypotheses about the deficiencies testing and re-testing these hypotheses, and modifying and re-testing them; perfecting them; and finally communicating the results" (p.22).

This formulation stresses the higher cognitive processes which *Sternberg (1985)* formulates as metacognitive. He describes metacomponents as higher order control processes used for executive planning, monitoring, and evaluation of one's performance in a task. Among the metacognitive processes which are important for creativity are: 1. Recognition that a problem of some kind exists; 2. definition of just what the nature of the problem is; 3. selection of a set of strategies or combination of strategies which are relevant to the task; 4. selection of one or more mental representation for information; 5. decision on how to allocate attentional (e.g. time) resources; 6. solution monitoring; and 7. being sensitive to internal & external feedback concerning the quality of task performance (pp. 99-105).

2.2.4 Creative press (or places)

Press may be considered as the interaction between persons and their environment. Creative places or environments include domains, fields and contexts. These can be seen to affect creativity through the general contributions and resources available to the individual, special effects and the nature of creative expression within a domain. These either promote or inhibit creativity *(Tradif and Sternberg, 1988,p.439)*. Further, fields provide peers who evaluate and confirm creativity in their domains *(Barron,1988)* while also protecting and freeing the developmental creative products and individuals from the

less congenial evaluations that may come from members of the general public *(Torrance,1988)*. Fields also affect the motivation of individuals working within them *(Amabile, 1983)*.

Creative acts cannot be understood from a psychological perspective alone. The unit of analysis must be the individual as part of his or her cultural environment. According to the logic of a part-whole structure, the primary focus must be on the cultural-historical context that makes the creative act possible and meaningful *(Floistad, 1993, P.203-206)*. Particular social and historical contexts are seen by some to be influential. Creativity can be viewed an outcome of these *(eg. Csikszentmihalyi, 1988, p.325)*. Alternatively, creativity can be seen as independent of any context beyond that with which it is immediately associated *(eg.Weisberg,1988)*.

2.2.5 Levels of Creativity

A few investigators have contended that it is necessary to consider levels of creativity. Ghiselin (1963, p.42-43) divides creativity into two broad levels:(1) primary and (2) secondary. Primary creativity includes altering the universe of meaning itself, by introducing in it some new element of meaning or some new order of significance, or more commonly both (e.g. Einstein's theory of relativity, Freud's psychoanalytic theory, Piaget's theory of child development, Binet's intelligence tests). Creativity at the secondary level "gives further development to an established body of meaning through initiating some advance in its use" (E.g. Terman who refined the Binet intelligence test).

Taylor (1959, pp.55-61) has also sought to reconcile some of the apparent differences in opinion concerning creativity by suggesting that creativity operates in terms of various levels. He suggests five levels: *1.expressive creativity:* involving independent expression where skills, originality, and the quality of the product are unimportant. The spontaneous drawings of children are examples of expressive creativity. *2. Productive creativity:* artistic or scientific products where there is a tendency to restrict and control free play and to develop techniques for producing finished works or products. *3. Inventive creativity:* this is the creative world of inventors, explorers and discoverers, those who seek new ways of using old things, where ingenuity is displayed with materials, methods, and techniques *4. Innovative creativity:* Improvement through modification with a great deal of an abstract conceptualising skill 5. *Emergenative creativity:* in rare instances an entirely new principle or assumption, around which new schools flourish, emerges at a most fundamental and abstract level.

Taylor pointed out that many people have the fifth level in mind when they talk

about creativity. Because this fifth level is so rare, the lower levels are usually involved in most investigations of creative behaviour. The discussion of levels is helpful in explaining that though all can be creative, they will not be at the same level of creativity. The majority will be creative at the lower levels (particularly children) and only a few people will reach the higher levels (Gulati, 1995, p.32).

2.3.0 Associationistic approach to creativity

Associative theory, as developed by Mednick *(1962)* defines the creative thinking process as "forming new combinations of associative elements which either meet specified requirements or are in some way useful (p.221)". He described three ways (*Serendipity, Similarity* and *Mediation*[8]) in which "mutually remote" ideas could be brought together to obtain a creative solution. Mednick's ideas gained some empirical support from the apparent validity of the *Remote Associates Test (RAT),* which was constructed on the basis of the theory.

However, perhaps because of a general disenchantment with associative theories of thinking, this approach has not been further developed. Koestler's *(1966)* bisociative theory[9] allows more complexity to mental organisation than Mednick's associative theory. He claims that a creative act involves linking together two previously unconnected "frames of reference" or "two separate entities". He proposes that creativeness is simply a process of arranging well - known facts into new relationships so that results may be achieved more effectively. The connection nearly always occurs as a flash of insight and is the result of subconscious thought processes (c.f. Kohler's theory of insight)

Similarly Wallach and Kogan(1965*)* propose the associative basis of the creative process, suggesting that "creativity involves the ability to produce more associations and to produce more that are unique (p.14-15)". A similar view is asserted by Cartier (1976), that "there is only one way in which a person acquires a new idea: by the combination or association of two or more ideas he already has into a new juxtaposition in such a manner as to discover a relationship among them of which he was not previously aware. An idea is a fit of associations".

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8 *(a) Serendipity:* refers to any chance contiguity of associative elements in the environment that leads one to a creative insight. *(b) Similarity:* associative elements of the stimuli that evoke those elements is a second route by which associations may occur. *(c) Mediation:* common elements, typically through the use of symbols (p.221-22). The third process (mediation) which leads to creative associations

9 *Koestler (1966, p.105-08)* explained his *Bisociative theory* with the example of Archimedes's case; how he solved the problem of measuring the volume of a Crown (first frame of reference-M_1) and the bathing (second frame of reference-M_2), flow of thoughts (m_2) leads to locating the target (T- the method of measuring volume of Crown) by linking (L) through a verbal concept ('rise of water level equals melting down of the solid body).

2.4.0 Psychoanalytic Approach to Creativity

According to the psychoanalytic theorists, creativity is the result of overcoming problems, usually those that begin in childhood. The creative person is viewed as someone who has had a traumatic experience which he or she dealt with by allowing conscious and unconscious ideas to mingle into an innovative resolution of the trauma. The creative act is seen as transforming an unhealthy psychic state into a healthy one (Dacey, 1929, p.43).

Freud (1906,1958*)* argues that the creative process depends mainly on *defence mechanisms*, which are unconscious attempts to prevent the awareness of unpleasant or unacceptable ideas. Because defence mechanisms prevent an accurate perception of the world and because they use up psychic energy, they usually interfere with creative productivity. He believed that although most defence mechanisms interfere with the creative act, the mechanism he called *sublimation* is actually the primary cause of creativity. He strongly believed that "people are only motivated to be creative when they cannot directly fulfil their sexual needs" (cited in Dacey, 1989, p.43). According to Freud creative activity is a form of daydreaming.

A close associate of Freud for a while, Jung (1928) also believed that the unconscious plays a vital role in high-level creativity but in contrast creativity is seen as emanating from the collective unconscious of the individual and it is this linking-in with the racial memory which gives masterpieces their universal significance. It is from this collective unconscious that the greatest inventions, theories, art and other new achievements are drawn. This process is what lends continuity to human existence.

Disagreeing with Freud and Jung, Adler (1927) developed the compensatory theory of creativity. He considered that creative power was necessary in each individual as the third power, in addition to heredity and environment, which combines the innate potentialities and environmental influences into a movement toward the overcoming of obstacles in one's life path. All individuals manifest themselves to be unique in thinking, feeling, speaking or acting. Even when two individuals do the same thing, the approach may not be same. He says that creativity is "supremely useful, and those who are more creative are more useful for purposes of serving a social function".

One psychoanalytic position has been developed by Kris (1952, 53*)* who emphasizes the role of the preconscious during the creative process, in particular the degree of preconscious elaboration of ideas from which a sudden 'solution' or 'inspiration' may emerge into conscious. Kris asserted that the defence mechanism of regression is involved in the creative act. When a person is able to regress to a childlike frame of mind the

barriers between the conscious and unconscious mind are weakened and the unconscious material is more readily available to awareness. This material frequently contains the germs of creative insights. May (1975) asserted that, "creativeness is the unconscious (ie, mindless awareness) breaking through into consciousness (ie, mindful understanding)". He further defined creativity as "the encounter of the intensively conscious human being with his or her world". Creativity "requires an intensity of emotion, a heightened vitality...I choose to call it a rage". Kubie (1958) viewed creativity as a healthy process. According to him, creativity is the result of preconscious rather than unconscious thought. He believed that the preconscious is the wellspring of creative thought.

Psychoanalytic theorists have emphasised the unconscious rather than the conscious. They suggest that creative people tend to suffer from emotional disturbances and are prone to be mentally ill. An extreme position argues that *"creativity is next to madness"* (Dacey, 1989, p.54). Though the source of creative thought may be unconscious, it is necessary for these thoughts to become conscious, otherwise they remain unrecognised and incommunicable (eg.Kris, Kubie and May).

2.5.0 Humanistic or Holistic Approach to creativity

In contrast to those adopting psychoanalytic approaches, humanistic psychologists feel that the creative person is emotionally healthy and sensitive to the needs and the capabilities of his/her unconscious to produce creative ideas. They equat creativity with mental health. "They give least importance to unconscious drives and compensation for deficits in the personality and much more credit to positive, self-fulfilling tendencies" (Dacey, 1989, p.50). According to them, creativity develops throughout life and can be cultivated throughout the life span.

Maslow (1957) believed that human beings have six basic instincts[10], which manifest themselves as needs. The first four are "deficiency" needs, because it is possible to satisfy them to the point that we are no longer deficient. When we feel hungry, it is possible to eat enough so that the need is fulfilled. At the highest level, the process of self-actualization is closely analogous to creativity. Self-actualization is seen as a manifestation of the life forces, which govern the creative process of nature. Personality itself is regarded as an emerging creative product. Free of neurosis, self-actualizing people are more likely to be creative. They are likely to achieve peak experiences, moments of unselfish ecstasy.

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10 (1) Physiological (2) Safety (3) Belongingness and love (4) Esteem (5) Aesthetic needs (6) Self-actualisation.

A creative act was seen by Rogers (1954,59) as motivated by the individual's desire to expand and grow, and hence 'form new relationships to the environment'. Therefore the creative individual needs to fulfil three[11] inner conditions (1959, p.34). Fromm (1955,59) described creativity as largely a matter of having the right set of attitudes. He suggested five[12] relevant attitudes that can be fostered at any point in life. In his view creativity stems from the basic human need to rise above one's instinctive nature. This need in turn orients the individual toward productivity and away from self-centredness. As Fromm put it :" In the act of creation humans transcend themselves as creatures, raise themselves beyond the passivity and accidentalness of their existence into the realm of purposefulness and freedom" (1955, p.29).

Humanistic theorists' believe that humans, not divine, cosmic, or other forces determine their own fate. This is not to say that humanism is atheistic, but that self-reliance is a natural human trait. Rogers and Maslow take a holistic approach since they see the creative product as the result of an interaction between the creative person and his/her situation. "They see creativity as more conscious, cognitive and intentional than do the psychoanalysts" (Dacey, 1989, p.54). The humanistic concept is that creativity is born through a striving for the highest possibilities in life, rather than as a defence against neurosis.

2.6.0 Gruber's Piagetian approach

Like Koestler, Gruber (1980) has analysed Darwin's evolutionary theory from a Piagetian[13] point of view. Gruber points to the long time periods involved in developing significant new ideas. Gruber emphasizes the slowness of changes according to Darwins's system of ideas, and interprets the process of the changes in terms of Piagetian notions such as assimilation (incorporation of new information into existing conceptual structures) and accommodation (changes in conceptual structure brought about by new information). Gruber argues that what appear to be dramatic breaks with the past, can be seen as the culmination of numerous small changes. This approach places " moments of insight"

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11 (A) An openness to experience – lack of rigidity and permeability of boundaries in concepts, perceptions, and hypotheses, also a tolerance for ambiguity where ambiguity exists. (B) The ability to evaluate – evaluation lies within the individual in his/ her own organic reaction to and appraisal of his / her product. (C) The ability to toy with elements and concepts – it is from the spontaneous toying and exploration that arise hunches, the creative seeing of life in a new and significant way (Rogers, 1959, p.34).

12 1. The capacity to be puzzled or surprised, 2. the ability to concentrate, 3. an objective knowledge of self, 4. the ability to accept conflicts and tensions resulting from polarity, and 5. the willingness to let go of security, such as parental support (see Dacey, 1989, p.52-53).

13 Piagetian theory, of course, mainly was concerned with the development of concepts in children, but Gruber shows that the approach can be usefully applied to conceptual growth in adults.

within their long-term context and would suggest that little understanding of high order creativity will result from laboratory studies of small-scale problem-solving. "If this approach is accepted, laboratory analysis of high level creativity would seem to be ruled out in favour of meticulous case studies".(Gilhooly, 1982, p.148).

2.7.0. Information processing approach to creativity

The *information processing approach* has been dominant (since the early 1960's) in cognitive psychology; the main stimulus for the development of this approach to thinking was the arrival of the computers. This approach takes the computer as its key metaphor for the mind, seeing people as computer-like systems that code, store, retrieve and transform information (Gilhooly, 1982, p.10-15). Information-processing technologists describe thinking as 'dynamic processes'. They equate the architecture of the brain with the computer and explain the process of thinking in terms of computer programming (algorithms and flowcharts). Simon (1966) has indicted how the *information processing approach* might tackle the topic of creativity in science. Thinking is seen as a hierarchical organization of elementary process carried out one at a time.

He argues that incubation and inspiration phenomena may be explained in terms of two mechanisms. The first is called familiarization[14]; the second is called selective forgetting[15]. In a problem-solving programme, the solution efforts are guided and controlled by a hierarchy or "tree" of goals and sub-goals. Thus, the subject starts out with the goal of solving the original problem. In trying to reach this goal, s/he generates a sub-goal. If the sub-goal is achieved, s/he may then return to the now-modified original goal. If difficulties arise in achieving the sub-goal, sub-sub goals may be set up to deal with them. Thus the course of problem-solving, then, involves continuous interaction between goals and information in long-term memory. In the course of pursuing goals, information is added to long-term memory. This information, in turn, helps to determine what new goals and sub-goals will be set up. When the problem is set aside, the goal information is lost and has to be reconstructed again. However, when the problem is taken up again, there is better information about the problem than the first time. This may lead to a quick solution where the previous attempts did not.

In a similar manner, Weisberg (1986,p.90) suggested that creative solutions develop as problem solvers acquire information indicating that their initial solutions were inadequate. In attempting to overcome these inadequacies, individuals try things they have

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14 Familiarization is a storing process, building up a representation of the problem and relevant information in long term (permanent) memory.

not tried before. Further, he points out that the initial attempt to solve a problem depends relatively directly on what the person knows about the problem when he or she starts working. Changes in the way the person approaches the problem (that is, "restructurings") occur in response to information that becomes available as the person works on the problem. That is, restructurings are not intuitive leaps into the unknown, but responses to changes in the problem. Finally, novel solutions to problems also arise in response to information that becomes available as the person works on the problem.

2.8.0 Boden's Impossibility theory

Boden (1990, pp.31-32; 1994, pp.76-77) distinguishes two senses of creativity. One is psychological (P-creativity), the other historical (H-creativity). A valuable idea is P-creative if the person in whose mind it arises could not[16] have had it before; it does not matter how many times other people have already had the same idea. By contrast, a valuable idea is H-creative if it is P-creative and no one else, in all human history, has ever had it before.

2.9.0 Convergent-Divergent thinking and Creative thinking

The interest of psychology in creativity is relatively recent. The work of Guilford is usually seen as the starting point for deliberate and explicit research on creativity. Guilford (1950,57,61,67,68,86) viewed creativity in terms of his theory of the structure of the intellect, derived from factor analytic procedures (five intellectual operations - cognition, memory, convergent thinking, divergent thinking and evaluation). Creativity is not seen as a unitary trait, but rather a collection of interacting and complementary, component abilities, all of which may enter into creative thinking. All genuine problem solving is creative and most, if not all, creative thinking is problem solving. Both problem -solving and creativity are productive thinking, which includes both convergent and divergent abilities. In convergent thinking the person follows the prevailing mode of thought, information and action to arrive at one right answer, which could be attained by other individuals also. Divergent thinking enables the individual to be more flexible and fluent, involving a richer flow of ideas and resulting in some novel or creative solution.

Divergent thinking abilities can be defined as the means the individual has for expressing whatever creativity he possesses. Guilford (1950,1962) maintains that these abilities are somewhat general and can be applied to a variety of tasks. They are not

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15 Related with forgetting; for example if a sub-goal is achieved it can be forgotten.

16 The 'could not' is defined in terms of what the person's mental representations and processes allow. So creativity always requires some mental restructuring. This restructuring can take various forms, but it must be defined in computational terms. For example, a creative solution to a problem space, or the devising of

associated with particular subject matter or disciplines. According to Guilford, these abilities together constitute creative thinking. The distinctive aspect of creative thinking is divergent thinking, which is characterized by, among other things, flexibility, originality and fluency. The meaning and scoring procedures for originality, elaboration and flexibility are explained in chapter VI.

2.10.0 Lateral thinking and creativity

According to De Bono (1992), "lateral thinking " is directly concerned with two senses, one of which is specific and the other more general[17]. He argues that creativity has a very wide and confused meaning. There are elements of "newness" and of "bringing something into being" and even elements of "value". There may be several entirely different processes involved in this wide definition of "creativity"; the term "lateral thinking" is, however, very precise. Lateral thinking is concerned with changing concepts and perceptions.

Divergent thinking is but one aspect of lateral thinking. Divergent thinking is interested in multiple possibilities, just like lateral thinking, but that is only one aspect of lateral thinking. The relationship between lateral thinking and creativity is overlapping. The term "lateral thinking" is reserved for the specific techniques and tools that are put forward as a systematic way of getting new ideas and new concepts. Creative thinking is concerned with new concepts and new ideas (p 56).

2.11.0 Creativity and Intelligence:

The relationship between intelligence and creativity has been reported to be highly significant. However, at the same time this is highly controversial. Guilford(1968) clearly distinguishes between the intellectual operations of 'divergent thinking' (creative process) and convergent thinking (which represents Intelligence). Generally it is accepted that the path to creativity lies through intelligence. Hudson (1966) has explored the statistical relation between measures of divergent and convergent thinking (or of 'creativity' and 'intelligence') and of the circumstances in which the two traits are more or less independent, with special reference to the 'threshold' theory. Empirical findings suggest that intelligence and creativity are statistically significant and positively correlated (eg. Dhailwal and Saini, 1976; Gulati, 1979; Guptha, K. K., 1979; Muddu, 1982; Patel and Joshi, 1978; Sharma, K. N, 1972; Bedi, 1974; Singh, Mathur and Sexena, 1977;

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a new technique (a heuristic) for directing the search for the solution to a particular part of the space.

17 **Specific**: A set of systematic techniques used for changing concepts and perceptions and generating new ones. **General**: Exploring multiple possibilities and approaches instead of pursuing a single approach.(p 55).

Gupta,G.S., 1979; Qureshi, 1980; Srivastava and Thomas, 1991), but some researchers have reported that there is no significant relationship between creativity and intelligence (eg. Getzels and Jackson, 1962; Wallach and Kogan (1965); Sansanwal and Jarial, 1979; Yamamato, 1964; Mehdi, 1977; Sharma, A. K., 1979; Chadha and Sen, 1981).

The bulk of the evidence points to the independence of creativity from conventional measures of intelligence (Gakhar and Kaura, 1976-77, Cropley, 1966). More accurately, there is a marked discontinuity between lower and higher IQ, so that little or no creativity occurs at levels below a high average (say, IQ 120) and above that point the correlation is negligible (Barron, 1963). That is, although highly creative people are typically high in intelligence, the reverse does not necessarily hold true, Sharma (1971) , in his study of both rural and urban high schools, reported some rise in creativity with intelligence. Further, he reported a consistent rise in creativity of the lower IQ levels but after 120 IQ the relationship demonstrated inconsistent fluctuations. Similar findings have been reported by MacKinnon (1962), Venkat Rami Reddy and Balakrishna Reddy(1983), Fuchs-Beauchamp, Karnes and Johnson (1993). However, the kinds of correlation outlined would occur even if the correlation between IQ and creativity were high, as a result of the restriction of range resulting from concentrating on those with IQs over 120. For example, Torrance (1966) reported that the correlation of creativity scores with IQ was 0.50 for children with IQ scores below 120, but only 0.20 for children with IQs above 120, if correlations across the whole ability range were in reality 0.80.

Dutt, Bountra and Sabhrawal (1977) showed a curvilinear relationship between creativity and intelligence. To a certain extent they go together but thereafter take different directions. As such, highly creative students need not necessarily be highly intelligent as well. As McNemar (1964, p.879) pointed out, high IQ is no guarantee of creativity, but a low IQ means that it is impossible.

2.12.0 Summary and Conclusions

To summarise, creativity has different meanings, at different times and in different contexts. Generally creativity has been discussed in terms of its end product, the creative person, and also of the creative process and creative environments. However, creativity has not been precisely defined in the context of the school. Much research has concentrated on the relationships between creativity and intelligence in school and this is a matter of considerable debate. One way to explore creativity in the school context would be to see how teachers perceive creativity.

Chapter-III

Creative Thinking and Its Development in Students

3.1.0 Introduction

In chapters III, IV & V, the relevant literature will be reviewed to provide a backdrop for understanding the present status of research pertaining to the different variables included in this study, to formulate ideas and to provide a conceptual framework for the study. The present chapter examines the research examining the identification of creative children, the measurement of creativity, and its relationship to age, sex, SES, grade, and type of school. Chapters IV & V discuss the role of the school and teachers in promoting creative thinking among the children.

3.2.0 Is Every Child Creative?

According to Dean (1976), everyone is born with some creative ability. In some individuals there is a strong drive to work in a particular area or medium which helps him / her to acquire the knowledge and techniques s/he needs. In others the ability may be more general and its flowering depends very much on the opportunities s/he meets and the encouragement s/he receives. Beetlestone (1998) optimistically says, "every person has creativity to a greater or lesser degree, and all children are capable of rearranging ideas and generating meaning in original ways" (p.95).

If we do nothing at all about creativity, then obviously creative ability can only depend on natural talent. But if we provide training, structures, and systematic techniques, then we may be able to raise the general level of creative ability. Some people will still be much better than others, but everyone can acquire some creative skill (De Bono, 1992).

Creativity refers to some sort of originality to be found in anyone. This is not restricted only to great persons in the fields of science, fine arts, music, and the various disciplines of the humanities and social sciences. In fact, grains of creativity might be inherent in any individual in any sphere of activity. A carpenter, a mason, a modeller, a painter or a designer generally shows some unique originality in his/her art (Chaube and Chaube, 1994, p.380). In fact, all the remains or symbols of great civilizations and cultures are only marks of the originality or creative activity of the creator concerned. It is one of the functions of education to recognise the seeds of creativity in the child and to organise situations for developing it.

However, like all human characteristics, there is enormous variability in creativity between individuals and within groups. It follows then that some children are more creative

than others. When creativity is thought of as a trait that is normally distributed in the population, it can be argued that teachers have a responsibility to foster the creativity of every child and to consider how this can be done in all areas of the curriculum (Poole, 1979, Beetlestone, 1998, p.34). The teacher has the basis for introducing children to new experiences and for developing innate curiosity and exploratory, manipulative behaviour (Poole, 1979).

To view creativity as a special quality which occurs only in some people-something more elitist and esoteric possessed only by a few-is to deny for the majority of children the opportunity to develop as individuals as fully as possible. A 4-year-old or a 12-year-old can be highly 'creative' provided his/her activities are viewed as relevant to them rather than to recorded knowledge; that is, the commonplace can be placed in new (and creative) combinations that may not be absolutely new but are very new, even completely foreign, to the individual producing them (Poole, 1979).

3.3.0 How to Identify a creative child

Although all children have the capacity to be creative, some may be more creative than others. As Gulati (1995, p.32) said, though "all can be creative, they will not be at the same level of creativity". Then, what are the characteristics of classroom behaviours which are considered to be exceptionally creative?

Passi (1989, p.3) identified some of the exceptional classroom behaviours of creative children from a literature survey for the purpose of training teachers. The exceptionally creative child - tries to be original in his thinking, action or behaviour; puts uncomfortable questions to the teacher; does not always agree with what the teacher says or does; persists in or argues for his own point of view; identifies problems in the questions put or solutions given by the teacher; and tries to give as many answers as possible to broad/open questions put by the teacher. Cropley (1967) says, exceptionally creative pupils can be a problem for teachers. They make unexpected responses, do strange things, create diversions, ask embarrassing questions.

It is not difficult for a teacher to identify exceptionally creative children, if s/he is alert and careful in observing children's behaviour inside and outside the classroom. There are some broad indicators of creative children. According to Passi a teacher should observe the following: *(Passi,1989, p.6)*

☛- Does the child easily adapt to any situation at home, school or outside?
☛- Does the child think highly of himself/herself and his/her abilities?
☛- Does the child exhibit an urge to continuously improve his/her own performance?
☛- Is the child not disturbed easily, while working in challenging situations?

☛- Does the child strive to do his/her best in whatever task is assigned to him, not giving up easily?
☛- Does the child take risks in various activities?
☛- Does the child act according to his own will?
☛- Is the child more anxious than others in solving problems faced by him?
☛- Does the child not get confused when situations posed appear apparently logical or unconnected?
☛- Does the child show an ability to withstand stress without this affecting his behaviour?
☛- Is the child enthusiastic to work on the task assigned?

3.4.0 Measurement of Creative Thinking at High School Level

Creative people are an asset to society, as they lead to all-round intellectual, cultural and industrial development. It is a fundamental duty of schools and other educational institutions to identify such people at an early age and provide them with the opportunity to be creative *(Dey, 1986, p.68)*. *Torrance (1962a, 1962b)* considers that a creative individual may be identified through measuring creativity. Measurement of creativity may be important because: it enhances our understanding of the human mind and personality, is helpful in individual teaching, guides mental growth and gives an indication of mental health, provides clues for arranging remedial programmes, helps in the evaluation of programmes and the need for guidance in future.

Torrance (1964) commented that of the different educational levels, the high school years have been the most neglected in creativity research. Information has accumulated concerning the pre-school and elementary school years because of interest in the 'creative imagination'. But educators appear to have had much less interest in the 'creative imagination' of high school students. Information has also accumulated concerning creativity during the college years, because many outstanding creative scientists, writers and performers of many kinds began their productivity during these years and because it has been deemed appropriate for colleges to produce professionally trained people who make creative contributions. No such expectations exist for high schools.

Devices for assessing the creative thinking abilities of high school pupils tend to be group-administered tests with verbal stimuli requiring verbal responses. Although some of the devices originally developed for use with children have been extended into or through the high school years, most of the instruments used with high school students were initially developed for use with college students or adults (Torrance, 1962a, pp30-31).

Any test which purports to assess creativity should have the potential to tap the ability of the individual to associate and utilise information in new and different ways. The approach to the measurement of creativity is largely determined by the manner in which

it is defined.

There are a variety of tests of creativity, which have evolved through research into the nature of creativity and educational uses in assessment. Tests tend to be measures of aspects of creativity as seen from different theoretical and conceptual starting points. Most are based directly or indirectly on Guilford's idea of divergent thinking. Divergent thinking (DT) is the ability to generate many different responses to an open-ended question and can lead to a range of possible solutions to the problems. The responses are scored for fluency, flexibility, originality and degree of elaboration.

Getzels and Jackson (1962) constructed 5 tests to measure creativity, known as (a) word association test (b) uses for things (c) hidden shapes (d) fables (e) make up problems. Wallach and Kogan (1965) also developed tests of creativity: (a) instant test (b) alternate uses test (c) similarities test (d) pattern meaning test and (e) line meaning test. Also, Mednick and Mednick (1967) developed the Remote Associates Test (RAT) as a means of assessing individual differences in creativity. In this test, each of the 30 items consists of 3 words, known to be mutually remote. The subject's task is to produce a fourth word, which is a common associate of all 3 remote words. For example: railroad, girl, class: here the fourth word working associatively links these words as working on the *railroad,* working *girl* and working *class (p.227).* This test did not have the wide-ranging impact of divergent-thinking tests like the Torrance Tests of creativity (Rose & Lin,1984).

The most used test is that of *Torrance (1966),* called the Minnesota Test of Creative Thinking (MTCT). Sub-tests of MTCT are divided into three different categories:

I. Verbal tasks using verbal stimuli.

Sub-tests:(I) Unusual uses task (ii) Impossibilities task (iii) Consequence task (iv) "Just suppose" test (v) Situations task (vi) Common problems task (vii) Improvements task (viii) Mother Hubbard problem (ix) Cow jumping problem (x) Imaginative stories task

II. Verbal tasks using nonverbal stimuli.

Sub-tests: (I) Ask and guess test (ii) Product improvement task (iii) Unusual uses task

III. Non-Verbal Tasks:

Sub-tests: (I) Circles and Squares task (ii) Picture construction task (iii) Incomplete figures task.

According to one comprehensive survey of creativity research (Torrance & Presbury, 1984), the Torrance tests have been used in three-quarters of all recently published studies of creativity involving elementary and secondary school students, and 40% of all creativity studies with college students and adults. The Torrance tests dominate the field of creativity research to such an extent that, in what was intended as a

comprehensive meta-analytic evaluation of the long-term effects of various creativity training programmes, only studies that employed the Torrance tests were included (Rose & Lin, 1984) (in Baer, 1993, p.15).

Early work on creativity tests by Getzels and Jackson (1962) showed that groups of bright adolescents could be found who scored relatively high on IQ tests and relatively low on tests such as Guilford's uses of a brick, or vice versa. The two groups did not differ in scholastic achievement. However, not only did Getzels and Jackson fail to validate their 'creativity tests', they also failed to show that either IQ or 'creativity' predicted scholastic achievement, because they did not check the later performance of individuals who scored high or low on both tests. Subsequent work with similar tests, in particular the Torrance Tests of Creative Thinking (TTCT of Torrance, 1966), has shown that tests can be produced that correlate moderately well with later measures of creative achievement, with some correlations in the range 0.4 to 0.6. (Torrance, 1988).

Torrance's (1966) original tests provide separate fluency, flexibility, originality and elaboration scores, as well as an overall creativity index. The most recent scoring system (Torrance, 1990), although more complex, is not a major theoretical departure from earlier systems (see Bear, 1993, p.15). These scores can be used separately, as measures of the component skills of divergent thinking, or combined into an overall divergent thinking index score. Torrance discouraged the use of a composite score, recommending instead that the sub-scales be interpreted "in relation to one another" (Torrance, 1974, PP 56-57). Kogan (1983, p.637) reported that fluency scores (quantity of responses) and the other "quality" scores (flexibility, originality, and elaboration) correlate so highly (ranged from .65 to .84) that "a strong case can obviously be made for exclusive reliance on the more easily storable ideational-fluency index".

Different investigators have used different types of criteria to assess or identify creative potential. All these identifying methods have been summarised by Getzels and Madaus (1969) under 5 categories:

1. ***Achievement*:** Highly recognised achievement, like a Nobel prize or any other marks of outstanding accomplishment as an index of creativity (eg.Ghiselin, 1952).
2. ***Ratings*:** Evaluation by peers, teachers, superiors, experts, etc., (eg Mackinnon, 1964; Drevdahl,1964).
3. ***Intelligence*:** Performance on intelligence tests-superior IQ as a criterion (eg., Terman, 1925).
4. ***Personality*:** Evaluation of personality characteristics in relation to a priori profile of creative personality (eg. Cattell and Drevdahl, 1955).
5. ***Creativity test scores*:** Performance on creativity tests such as those developed by Flanagam(1958), Buhl(1960), Guilford and Merrifield(1960), Mednick and Mednick (1964), Torrance (1964) and others.

There is still debate about whether these tests measure several divergent thinking skills or just one general divergent thinking skill. Despite this uncertainty, the widespread use of the Torrance tests has led scores on these tests to become the de facto operational

definition (or definitions, if sub-scale scores are used) of divergent thinking. There is an even more crucial uncertainty about the Torrance tests, however, that focuses on their validity as measures of creativity (Baer, 1993, p.16). Not everyone agrees that creativity can be assessed by a general paper-pencil test. Task-oriented psychologists, Amabile (1983) and Baer (1993) emphasise a task-specific view of creativity. They have suggested that the cognitive abilities underlying creative performance differ from task to task. The solution to this is to allow experts in their respective field to judge the product for creativity, using a consensual assessment technique. Consensual assessment of creative performance is neither difficult nor mysterious. Students can write poems which can be assessed by judges who know something about poetry. Amabile has shown that with student work, the ratings of teachers and of poets differ very little (1982,1983). However, it is important that raters do not know whose products they are rating and that the same judges evaluate all products. It is also wise to have multiple raters when possible, and to have more than one sample of each student's work.

Another difficulty with psychological tests, whether verbal or non-verbal, is that they may be culturally loaded and as such are not wholly applicable to different cultures (they are not "culture fair"). According to *Floistad (1993, p. 203)* people are part of their cultural environments; their creative acts are expressions of their own powers, as well as expressions of the factors in their cultural environment. Consequently, people's creativity cannot properly be studied without taking into account their cultural environments. As this study is set in India, we must ask what tests of creativity have been developed in that culture.

In India, two pioneering tests of creativity Baqer Mehdi (1973,1985) and Passi (1973) are extensively used. Similar to the above two tests Sudhir and Khiangte (1991) have recently developed a tool for the tribal cultures of India. Majumdar (1973) developed a scientific creativity test, and Kundly (1977) developed a creativity test in *Marathi* to assess the literary creativity of school children. Passi (1973) also developed a battery which consists of six sub-tests (verbal and non-verbal) for higher secondary school students.

The Baqer Mehdi tests of creative thinking (1973,1985) were constructed by combining the ideas of Guilford, Torrance, and Mednick and Mednick. They include both verbal and non-verbal creativity. Many researchers have used these tests. eg., Tiwari, Govind and Archana (1978), Prasad, V (1979), Singh, R. .P. (1980), Singh, D (1978), Mehra and Singh (1982), Agarwal and Kumari (1982), Bhoodev Singh (1981), Mahender Reddy (1989), and Agarwal (1992).

3.5.0 Creative thinking and its development in students

Like any other mental ability, creativity has its characteristic developmental trends which have been studied extensively. These trends have been established largely through a cross-sectional approach in which the creativity levels of children in different age groups have been studied (Guilford, 1964).

The developmental curves for most of the abilities thought to be involved in creative thinking follow a pattern which is quite different from most other aspects of human growth (Torrance, 1962a). Reviewing a number of earlier studies on the growth of creativity and giving results from many studies conducted by himself at Minnesota. Torrance (1962a) has described the developmental trends of boys and girls in creative thinking abilities.

3.5.1 Creative thinking- Age-wise development

Torrance (1962a, pp.84-105) observed that from eight to twelve years the child continues to develop his/her imagination and can use his/her skills creatively in many areas. After twelve years of age to fourteen, the spirit of adventure reigns supreme in both social and emotional fields. The skills involved in creative problem solving are slowly learnt during this period, though adventure still occupies an important part in life. However, peer acceptance and the unstable nature of interest and aptitudes may dampen the creativity of sixteen-year-old boys and girls. At sixteen to eighteen years youth is full of optimistic aspirations and considers arts and social activity as a means of enriching living. The individual develops the ability to channel his emotional energy, creatively and to solve problems of a complex nature. Subsequently Torrance (1967) observed a developmental pattern, noting increases in divergent abilities from preadolescence to adolescence. If divergent thinking, like other cognitive skills, becomes more accomplished throughout childhood and adolescent years, then we ought to observe age-associated increases in divergent thinking abilities consistently among young people of varied backgrounds.

Based on cross-sectional data collected in the United States, Jaquish and Ripple (1980) reported significant developmental increases in fluency and flexibility from preadolescence (mean age=11) to adolescence (mean age=16). In India, Sudhir Kumar (1992) studied students belonging to high (≥ 15) and low age groups (< 15). No significant difference was found between those groups in creative thinking ability.

3.5.2 Creative thinking - Grade-wise development

According to Torrance (1962a) there is an observed steady growth from grade one to three; then a slump between third and fourth grades, and a little recovery during 5th and 6th grades. Another slump occurs between the sixth and the seventh grade, after which there is again an almost steady growth until near the end of the high school years. Many explanations have been given to explain the setback in the growth of creative abilities at the fourth, seventh and eleventh grade levels respectively. According to *Torrance* these declines may be explained in terms of ".....reactions to a new stage of development or each transitional state in education".

In India, following Torrance, Kishore (1981) tried to explore developmental trends by using creativity measures and revealed a consistent increase from Grades VI to VIII (i.e. from age 11 to 13). After this period there appeared a general decline, except for non-verbal elaboration up to the age of fifteen (i.e. Grade X). Elaboration showed a tendency to develop with maturity and experience. The graphical displays revealed that the period of greatest potential productivity was found to lie between the ages 13 and 14.

Another study by Gakhar (1974) revealed that (i) the fluency and flexibility scores of the students showed an upward trend from IX to X grade which was followed by a decline from X to XI grade. (ii) The interaction effects of grades and sex were not found effective in accounting for the significant variances with regard to fluency, flexibility, originality, and total creativity of the students. (iii) The girls exhibited a significant increase in creativity from classes IX to X, followed by a significant decrease from class X to XI. But Gupta's (1979) results revealed no significant difference in the creativity scores of male and female students (N=496) of classes IX, X, XI and XII. Contradictory results were also shown by Jarial and Sharma (1980), in that students (N=200) of X grade were significantly superior to the students of IX grade in fluency and total creativity, whereas, no significant differences were found in the flexibility and originality scores of the students of these two grades. In their subsequent research (1981b) they found no significant difference, except in flexibility in the Fluency, Originality and Total creativity scores of IX and X grade students.

3.5.3 Creative thinking and sex differences

The topic of sex differences in creativity has intrigued generations of psychologists and educational researchers. Despite considerable research there are still contradictory views about sex differences in creativity. Some studies have shown the superiority of males

over females, others the reverse; some have reported non-significant differences between males and females.

The view that sex is related to the creativity of pre-school children is reported by Bolen (1976), Westra (1978), Torrance (1980), Smith (1990). Also many researchers in India, (Acharyulu and Yasudhara, 1984; Singh, A, 1991; and Srivastava and Thomas, 1991) reported the same findings.

Strauss and Strauss (1968) in a wider cross-cultural study observed clear cut sex differences in American and Indian student populations. In both societies, boys were significantly more creative than girls. They further established that the gaps were wider in Indians than Americans. This was attributed to the degree of cultural and social uplift of females in American society. Mar'I (1971) found that Arab male rural subjects of viii grade scored significantly higher than females in nine scores out of thirteen drawn from the battery of Torrance tests of creative thinking (TTCT).

Andrews (1930) reported that girls reached the high point of their imagination one year earlier than boys, while Starkwather and Cowling's (1963) found that girls scored higher, though not significantly so, on flexibility while boys scored higher than girls on the measures of originality and elaboration.

Kershner and Ledger (1985) found that sex was highly significant in relation to creativity. Girls scored higher than boys did on several creativity sub-tests. *Jaquish and Ripple (1980)* reported adolescent sex differences in divergent thinking which are consistent with a general position regarding the tendency for females to perform better than males on verbal tasks. Ogletree (1968) conducted a study on a large sample of 1165 sixth grade girls and boys from England, Scotland and Germany. He found that English and German girls were significantly higher on both verbal and non-verbal creativity, but in Scotland girls were not significantly higher than boys, though their mean on figural creativity score was higher.

In three separate studies, Torrance (1961;1963;1965) found a number of differences between the sexes on his measures of creative thinking ability. In general, girls excelled boys on all verbal tests, especially after the fourth grade. But boys were superior to girls in a creative thinking task-involving experimentation with science toys. Markewitz (1984) reported that males excelled female on originality, flexibility and total creativity scores.

3.5.3.1 Studies on Verbal Creative thinking

Studies in India on gender differences undertaken by the researchers Prakash (1966) Raina(1969), Rawat and Agarwal (1977), Passi(1972), Badrinath and Satyanaryana (1979), Sharma (1979), Dharmangadan (1981), and Shukla (1982) showed that boys were superior to girls on all aspects of verbal creativity. Boys performed better than girls on the originality dimension (eg. Badrinath and Satyanaryana, 1979; Awasthy,1979). In fluency also boys have been reported as superior (Awasthy,1979; Jarial and Sharma, 1981a).

Some studies have reported that girls are more creative than boys in all dimensions of verbal creative thinking (Passi,1972; Hussain ,1974; Rawat and Garg,1977; Chadha and Sen, 1981; Jarial, 1981; Ahmed, 1987) while girls' domination in the originality dimension has been reported by Jarial and Sharma (1981a) and Singh(1981).

No statistically significant sex differences were reported on the dimensions of verbal creativity by Phatak (1962), Thammaprateep (1976), and Rasool (1977). In fluency (Badrinath and Satyanaryana, 1979) or the flexibility dimensions (Jarial and Sharma., 1981a, Badrinath and Satyanaryana, 1979).

3.5.3.2 Studies on Non-verbal Creative thinking

In some studies of non-verbal creative thinking boys' scores have been shown to be significantly higher than girls (Raina,1969; Dharmangadan,1981) while in others girls have been shown to score higher than boys (Passi,1972; Bedi, 1974; Channon,1974). Singh (1978) reported that the girls were superior to boys in originality, fluency and elaboration of non-verbal creative thinking.

Some studies have found no sex differences in non-verbal creativity (eg.Vohra,1975; Badrinath and Satyanaryana, 1979; Singh,1993). While Singh (1978) found no sex difference in flexibility of non-verbal creativity.

The evidence regarding gender differences is inconclusive. This may be due to the role of other factors affecting performance. The socio-cultural environment and the technical advancement of society, SES, incentives at home, the school environment, the availability of resources for creative output, personality characteristics and other such factors may be important. Thus, gender in itself should not be treated in isolation, as a determining factor in creativity.

3.5.4. Creative thinking and Socio-Economic Status (SES)

The term "socio-economic status" refers to an individual's position in a society which is determined by wealth, occupation and social class (English and English, 1958).

Ogletree and Ujlaki (1973) reported a positive correlation between social class status and creativity. The creativity scores of the upper class were significantly higher than those of the middle and lower class samples. Smith (1965) found that among fifth grade white children in Pittsburgh, the middle class performed significantly better on verbal tasks, but the lower class excelled on non-verbal items.

Getzels and Jackson (1962) categorised their sample[1] from private schools into two experimental groups, a high creative group and a high IQ group[2]. They studied school performance, motivation for achievement and career aspirations. They analysed career aspirations and categorised them into conventional (lawyer, doctor, professor) and unconventional (adventurer, inventor, writer) categories. They found that high creative children gave a significantly greater proportion of unconventional career aspirations than did the high IQ's (16% and 62% respectively) (Getzels and Jackson ,1962, pp 57-58).

The parents of the high IQ child also tended to have a somewhat higher educational level than the parents of the high creativity child. But what is perhaps more noteworthy is the greater specialised training of both the mother and the father of those with high IQ's. A greater proportion of the high IQ fathers than of the high creativity fathers were found in academic or educational occupations. But, despite their greater professional training, a somewhat greater proportion of the mothers of the high IQ children than of the high creativity children were exclusively house-wives and did not hold other full or part-time jobs. It would seem that the mothers of high IQ subjects had more time to devote to their children than the mothers of the highly creative subjects. High IQ mothers were in fact likely to be more vigilant about the "correct" upbringing of their children than the high creativity mothers (Getzels and Jackson ,1962, pp.62-64).

In India, Sharan (1986) has shown that socio-economic status is a mental construct, a degree of esteem or lack of esteem which people in a society display towards on individual. High socio-economic status, therefore, indicates a high income, high status occupation and adequate living conditions, whereas, low socio-economic status refers to poor income, low occupation and inadequate living conditions. High socio-economic status is considered to provide a healthy and enriched stimulating environment in which personality may develop appropriately, whereas children of low-income groups may

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1 N=449: 245 boys; 204 girls- Grade 6th through the senior year of high school)

2 1. The High Creativity Group: These were subjects in the top 20% on the creativity measures but below the top 20% in IQ (N=26).
2. The High Intelligent Group: The top 20% in IQ, but below the top 20% on the creativity measures (N=28) (p.20).

develop feelings of insecurity and inferiority and an unhealthy attitude toward people and objects.

In relation to creativity, Sharma, A. K.(1979) revealed that students of upper socio-economic status scored significantly higher on creativity than students of upper middle, lower middle and upper lower socio-economic status. Other researchers e.g. Pandit (1976), Singh (1977), Srivastava (1978), Jarial (1979), Vijai Lakshmi (1980), Sudhir Kumar (1992) have found similar results.

Also in India, Awasthy (1979) reported that students of very high SES were superior to the students of high, average and low strata of SES in flexibility, originality and total creativity, while students of high SES were superior to the students of very high, average, and low strata SES in fluency. The results of Sharma and Jarial (1980) support the above results, whereas those of Sharma (1980) were different. Students of high SES scored significantly higher than the students of low SES in fluency, whereas no significant difference was found in the flexibility, originality, and total creativity scores of these groups.

Some studies have revealed that in India there is no significant difference in the creativity scores of high, middle and low SES students (*e.g. Seetharam and Vedanyagam, 1979; Guptha, A.. K, 1980; Chadha and Sen, 1981)*

Singh (1980) studied student teachers and concluded that all three indices of family background, viz., education, occupation and income of the father were quite significant in determining the development of creativity. Sudhir Kumar (1992) reported that father's education and mother's education were found to foster higher creative thinking ability; the students with well educated parents attained higher creativity scores than those with illiterate parents. Parental occupation was not found to be a factor related to the creativity of children.

Raina (1968) found that a higher creative group came from parents who were comparatively better educated than the parents of lower creative students. Srivastava (1977) also observed that the children of highly educated parents scored significantly higher than the children of less educated parents on a creativity test. A more recent study by Mukhopadhyay, Chakrabarti and Kundu (1990), revealed that parents' higher level of education was a favourable factor for the development of creativity in their children. *Ahmed (1980)* found a significant difference in the verbal and non-verbal creativity of students coming from advantaged and disadvantaged home backgrounds, favouring the former.

Overall, the research in India tends to suggest that there is a relationship between SES, parental education and creativity.

3.5.5 Creative thinking - different types of schools

The effect of different kinds of schooling has been subject to many investigations, *Ezekeil (1966)* found democratic school administration fostered creativity and initiative in teachers and broadened understanding on the part of all concerned. Haddon and Lytton (1968) found that traditional schools emphasized convergent thinking and authoritarian learning, while in informal or progressive or open schools the emphasis was on self-initiated learning and creative abilities.

The majority of studies in India indicate that type of school is a significant factor in developing creativity. Rastogi (1967) and Chatterjee (1970) both found that the students of well-equipped and advantaged schools did better on creativity tests than students of ill-equipped schools. Sultana Ahmed (1980) studied different types of schools, viz., extremely advantaged schools, slightly disadvantaged schools and extremely disadvantaged schools (The schools' category was defined in relation to the adequacy of buildings, library, furniture, teacher-pupil ratio, sports facilities etc.). It was found that pupils in the extremely advantaged schools scored higher on creativity.

A study by Sehgal (1978) revealed that the students of model schools *were* more creative than those of government and private schools. Sharma (1982) explored the relationship of creativity with certain background, psychological and organisational factors of students of government, private, aided, public and central schools. The study concluded that creativity was significantly related to organisational variables like the management of schools. Another study by Agarwal (1992) compared four types of schools and concluded that Kendriya Vidyalays (managed by central government) were most creative; next in order were the students of public, government (managed by state government) and aided schools (grant maintained). The type of educational administration in a school is a significant factor in the development of creativity. The efforts of Kendriya Vidyalays get due rewards in the form of the growth of creative potential of their students.

A study by Gupta (1978) in four higher secondary schools (Government and private) revealed that the students of private schools scored significantly higher than the students of government schools in different dimensions of verbal and non-verbal creativity. All dimensions of creativity were significantly higher for the male and female students of private schools than the male and female students of government schools. Also, Mahender Reddy (1989) studied the type of the school (private or govt.) as one of the variables. He

found that the students from private schools were superior in all aspects of creativity over government school students. Boys' and girls' scores from both types of school significantly differed.

Only one study, by Dwivedi and Sharma (1987), has been conducted on 40 IX class students studying in Government High Schools, Bikaner in Rajasthan (India). The main objective of the study was to investigate those factors which inhibit or enhance the level of creative thinking amongst high school boys. Three groups of factors were considered. It was concluded that the orthodox nature of the family, its economic background, family disputes, an inability to converse fluently due to language difficulty, a lack of adequate teaching aids, a lack of opportunities to do creative work and a lack of new knowledge in the classroom were some of the important factors which affected creative thinking amongst high school boys.

Many studies in India have focused on comparing government schools with other schools. This exception (*Dwivedi and Sharma, 1987)* concentrated on government schools. But their study is inadequate in many ways. A comprehensive study with a large sample comprising students, teachers and head teachers is needed to develop a deeper understanding of the real situation and emerging issues and problems in government schools.

3.6.0 Summary and conclusions:

Every child possesses at least some creativity. Its development depends upon how teachers identify and foster it. Teachers' interest in it seems to be important. Other evidence relating individual characteristics and creativity shows that: 1) creativity increases with age up to a particular age level beyond which it starts decreasing;. 2) the relationship between grade levels and creativity is inconsistent; 3) the evidence regarding gender and creativity is unclear; 4). SES influences creativity; usually the higher the level the greater the creativity; and 5). Students studying in government schools in India perform poorly when compared with other type of schools.

It would seem that there is a need for a study which attempts to take account of all of these factors in considering creativity. Further, it is necessary to study the causes for underachievement in government schools in India. The role of the school and the views of teachers working in the schools may be important. The succeeding two chapters will discuss the literature relating to the role of the school and teachers in promoting creativity.

Chapter IV

Creative thinking and the School

4.1.0 Introduction

The purpose of this chapter is to highlight the role in promoting creativity of the school as, one of the agencies which contribute to the personality development of children. The chapter considers the school environment, barriers to creativity, how schools may be overemphasising the curriculum and examinations, and the role of the headteacher.

4.2.0. Creative Thinking - the role of the School

Considerable attention is being directed towards the identification of factors in the educational environment which are important from the point of view of creativity development. According to *Toynbee (1964)* one of the most convenient places where creativity can be developed is school. The school can be the catalyst for talent identification and development *(Passow, 1995, p.55).* The school is an interpreter and a moulder of society and is itself a society in miniature (Powell Jones, 1972).

There are several aspects that need to be cultivated in schools to promote the development and expression of creative abilities. There is a consistent thread running through the suggestions made by most researchers concerning how to assist in the fulfilment of the creative potential in children. They suggest that the school must take the lead in creating total learning environments that combine the promise and the capabilities of all educating and socialising settings.

Lytton (1971) suggests two main ways in which schools may hope to enhance children's creative abilities. One is to introduce special educational experiences[1] and the other is to generate a creative spirit in the school[2]. *Taylor & Williams (1966)* argue that school experiences should involve children more positively in the whole process of education - in questioning, listening, discussing, thinking and being actively and deeply involved in practical working with a wide variety of materials. This is achieved through a personal relationship based on trust and respect between teacher and children.

Students can make use of their creative potential in learning only when they are provided with opportunities to learn in an atmosphere of freedom, that is, they, should be free to experiments with new ideas, and time-worn practices or techniques should not be

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1 Deliberate training in creative thinking or problem solving skills as such, unrelated to normal school subjects, and these techniques, e.g. brainstorming, synectics and the 'productive thinking programmes'
2 to adopt an experimental, creative, open-ended approach to learning in each individual field of the ordinary curriculum.

allowed to impede this. According to Torrance (1962,p.114) many creative children prefer to learn on their own, but schools have been slow in providing such opportunities.

Alencar (1993,p.94) argues that "there are several aspects that need to be cultivated in the school to favour the development and expression of creative abilities. One of these aspects are several personality traits[3] which traditionally have not been cultivated in the educational setting (in Brazil)". Rogers (1959) laments that schools are turning out conformists and stereotyped individuals, rather than creative and original thinkers. He expresses concern that schools have been preoccupied too long with order and control.

According to *Goyal (1973)* "the death knell to creativity is rung in schools by laying too much emphasis on conformity, rigidity, strict obedience and traditionalism". Conformity and teaching on conventional lines discourages spontaneous and independent thinking (*Vernon, 1967). Bloom (1958)* also argued that "the educational system as it prevails today can reduce originality and creativity. This negative effect on creativity is most marked when examinations, instructional materials and processes all emphasise learning by rote and the goal is centred on getting through examinations (p.599)". Too often, the school environment with its overt and covert aims and objectives contributes negatively to creative activity *(Wallace, 1986, p.71)*.

In India, Chaube and Chaube (1994) describe how

"when the child starts going to school he confronts an authority which may be in the form of a teacher, an older class-fellow, a guardian or text-book. He begins to learn on the basis of this authority. He generally accepts what his teacher, elder, guardian or the textbook says. So there is little scope for him to reason why. Consequently, the school is not regarded as a suitable atmosphere for the development of creativity, unless consistent efforts are made for the same and the children are encouraged to investigate, invent and find out things for themselves (p. 383-84)". Towards that end, it will be better if the following points are taken into consideration in the school for the development of creativity in children.

1. Children should feel free to express their views to the teacher. There should be no imposition of any authority on them. They should be free to investigate and find out facts and formulate their own judgements.
2. The teacher has to function as a friend and guide to the children.
3. The curiosity of the child should be satisfied with affection, sympathy and tolerance.
4. Any view of the child must not be ridiculed, even when it appears to be funny. The child should always be encouraged to put any question that comes to his mind.

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3 For example, independence, self-confidence, initiative, persistence as well as an attitude of reception of new ideas, flexibility, courage to express divergent ideas and points of view are some characteristics that have not been reinforced in the classroom.

5. The curriculum for the child should be such as to allow ample scope for investigation and experimentation. The child should not be required only to memorise the contents of the course.
6. Teaching in the class should not be subordinated to examination, otherwise the child will become busy in preparing himself for examination and will become blind to the grains of creativity inherent in him.

Schools in India have generally ignored and have been almost indifferent to the area of man's creative abilities (Agarwal 1992, p.26). It is generally agreed that school programmes are not giving due place to the educational experiences and proper environments which are conducive to the development of creative potential. This may be due to an unawareness of the importance of creative talent in relation to national development, or to inadequate understanding of the creative process on the part of teachers, difficulties in identifying creative children or a lack of knowledge of factors which inhibit and accelerate the development of creativity.

Chakraborthy (1992) concluded that in Indian schools no attempt is made by the teachers to encourage divergent thinking abilities of children. Such an absence of effort to promote the creative thinking abilities of pupils may be attributable to the scanty knowledge of teachers about the nature of talent and strategies for its development (p.177). The scientists, industrialists, politicians, artists, writers and medical researchers of the future are currently in the schools, yet present educational practices typically fail to foster creative growth among them; they perhaps even stifle the imagination of students.

4.3.0. Creativity - School Environment

Creativity does not blossom in a vacuum. The creative mind interacts vigorously with the nexus of supportive and stimulating factors in the environment, whether at home or at school (Weisberg and Springer, 1967). As Lowenfeld and Brittain (1982, p.70) suggest, "Creativity does not just happen. It is an essential part of the learning process". A stimulating school environment, proper physical facilities, and a free atmosphere help in fostering creativity among children (Passi,1989, p.10). Adequate resources, i.e., better buildings and equipment, and a greater range of opportunities are needed to promote creativity (Woods, 1990, p.51). But Woods also argues that sometimes an element of hardship is required.

According to Stein (1974) stimulating creativity involves not only stimulating the individual but also affecting his/her social milieu and the people in it. If those around the creating person do not value creativity, if they do not provide the necessary supportive environment, if they do not accept creative work when it is completed, then it is likely that the creative individual's efforts will encounter serious if not insurmountable obstacles.

Rogers (1954, p.147-49; 1959, pp.78-80) outlines two environmental conditions that are conducive to maximizing people's creative abilities:(1) psychological safety[4] and (2) psychological freedom[5]. Creativity depends upon many environmental factors particularly related to home, school and community. As *Passi (1989, p.7) says* the atmosphere at home, at school, in the community and in the culture to which the child belongs may be authoritarian. Such an atmosphere demands that he behaves according to elders' 'expectations', not permitting him to question them. This can become a barrier for creative development. The family environment is also a considerable influence[6] on the development of creativity and personality traits (Getzels & Jackson, 1962, Domino, 1979, Sloane, 1985, Passow, 1995).

Freeman, Hale and Cheshire (1985) emphasise that creativity is fostered in an environment where the child is emotionally secure and encouraged to take risks with new and unfamiliar ideas. Free and imaginative play is an essential requirement for the free growth of cognitive and affective functioning, but this must also be allied to the sensitive and unobtrusive intervention of the teacher or parent, which extends and encourages the child's questioning. Creative thinking demands self-confidence, and an environment which promotes free thinking and acceptance of new ideas (p.100). Beetlestone (1998, pp.107-08) also emphasises three aspects of learning climates (or environments) to foster children's creativity: 1. ***the physical climate*** (created through the organisation and management of space and resources); 2. ***the intellectual climate*** (which provides the appropriate degree of stimulation and challenge), and 3. ***the emotional climate*** (wherein the learner's needs are met).

Csikszentmihalyi (1988) says "we cannot study creativity by isolating individuals and their work from the social and historical milieu in which their actions are carried out". He argues that creativity is never the result of individual action alone; it is the product of three main shaping forces: 1). field (social institution), 2). cultural domain (preserved and transmitted for future generations), and 3). individual (who brings change in the field and domain) (p. 325). Further, he criticises the person-centred view of creativity (see in

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4 Psychological safety means: (i) a sense of their own inherent worth; (ii) a climate in which highly judgmental evaluation of them is absent(to minimize threat and need for defensiveness); and (iii) a feeling that they are receiving empathic understanding (to convince them that teachers appreciate what they are feeling and doing from their own point of view).

5 Psychological freedom means a permissive attitude toward people's symbolic and productive expression, allowing them to think, feel and be whatever coincides with their innermost goals.

6 For example child rearing practices, parents' personality characteristics, parents' expectation toward the children, their degree of acceptance, encouragement, respect for the children's ideas, feelings, and questions, freedom of expression, and autonomy.

Alencer, 1993, p.93), stating, for example, that "to study creativity by focusing on the individual alone is like trying to understand how an apple tree produces fruit by looking only at the tree, and ignoring the sun and the soil that support its life".

4.3.1 Barriers to Creative Thinking

Adams (1979) explains that "the conceptual blocks are mental walls that block the creative problem solver from correctly perceiving a problem or conceiving its solution (p.11)". 1) *Perceptual blocks* -one's past experience makes it difficult for one to look at a problem from various viewpoints. As long as one is locked within one viewpoint, producing the original ideas required to solve a difficult problem will be impossible (p.13). *2) Cultural and environmental blocks* - cultural blocks are acquired by exposure to a given set of cultural patterns. Environmental blocks are imposed by our immediate social and physical environment. (For example, lack of economic or organizational support to bring ideas into action, lack of cooperation / acceptance and trust among colleagues, autocratic bossism. p.31). *3). Emotional blocs* - Insecurity, fear of making a mistake, failing, or taking a risk (fear of punishment for mistakes, fear among the students in giving answers), since production of a creative idea involves taking risks (p.53), and 4). *Intellectual and expressive blocks* - inflexible or inadequate use of problem-solving strategies, or inadequate information before being the problem. Expressive blocks include inadequate language skill to express or record ideas (p.63).

Hill(1992) examined the environmental barriers to creative expression. These include lack of freedom, inappropriate reward systems, and insufficient resources and time. Environment stimulants to creative expression include freedom, sufficient resources and time, enthusiastic management, a non-threatening and collaborative atmosphere, recognition and reward, and challenge. As Bowes (1986, p.121) has argued, creative potential is blocked by the nature of a formal and hidden curriculum which de-powers the individual and by a climate of learning characterised by fear of failure and loss of self-esteem. The challenge cannot be met by curriculum reform alone. Sound innovation requires a facilitative climate in which both young people and teachers can enjoy "freedom to learn" and realise their creative potential

Hallman (1967, p.325) listed some of the inhibitors to creativity in schools. They include pressures to conform to teacher-chosen goals and activities, standardized routines and tests or an inflexible curriculum; authoritarian attitudes and environment; domination of teachers of pupils for any reason, threats of any kind, fears which may be engendered of failure to obtain right answers; over-emphasis on grades or rewards; and insistence on

or demand for fixed and predetermined answers.

As Hurlock (1978) pointed out, the most common hazards for developing creativity include failure to detect creativity in time to stimulate it when it is developing, unfavourable social attitudes toward creativity and conditions in the home and school that are unfavourable to its development (p.348). The school, by not providing adequate facilities, instructional materials and freedom to teachers and students, may create another barrier. In the classroom, if a teacher is not providing opportunities for children for free thinking, expression and actions, to that extent s/he is hindering the development of creativity *(Passi, 1989, p.7).* Such a classroom teacher is generally concerned with maintaining discipline, completion of the course, confining work to textbooks, over emphasising rote learning, criticising children for wrong answers, not posing many open-ended questions nor allowing students to put questions and so on (Ibid, p.7).

4.4.0. Creativity - Curriculum in secondary schools

The term "curriculum" is applied to those ideas and experiences chosen by the school for use by the students for the achievement of established goals. Traditionally the curriculum is viewed as a number of subjects to be mastered by the learner. Curricula or courses of study describe the ground which pupil and teacher try to cover to attain the objectives of education. However, in a broad sense the curriculum does not mean only the academic subjects traditionally taught, but includes the totality of experiences which a child receives at the school under the guidance of teachers (Singh, B. P, 1991, p.1).

Curriculum is a means by which we put an educational proposal into practice. It is concerned with the entire context of pupil-curriculum-teacher relationships (Singh, B.P 1991, p.34). "Curriculum is conceived of as the whole of the interacting forces of the total environment provided for pupils by the school and the pupil's experiences in that environment" (Anderson, 1956), which can meet pupil's needs and can also assist in helping him or her adjust to his/her socio-cultural climate *(Singh, B. P., 1991, p.158).* The curriculum must help students in developing skills, interests and habits which may be helpful to them as individuals and for the society in which they will have to live.

Aggarwal (1990) suggested that those activities should be included in the curriculum which enable the child to exercise his creative and constructive powers. One objective of education is to discover and to develop special interests and aptitudes. For instance, the Review Committee NPE'86 (1990) suggested that the curriculum should be a self-sufficient package of knowledge, aptitude and skills with which the child can go into the 'world of work' and continue self-learning throughout life (p.299).

The curriculum should be dynamic. It should not be confined to the prescribed textbooks only. It must embrace the world outside the school as well as the creativity of the child and the teacher. Agnihotri, et al. (1994,p33) argue that the curriculum should focus more on the process rather than the product. This will help the child to develop understanding rather than just accumulate information. It should also equip the child with analytical and creative skills. It is something that must develop continuously and should not be a package (Ibid, pp.32-33)..

There is no doubt that the existing Indian school curriculum is biased in favour of convergent and rote learning *(Agnihotri, et al., 1994, p.143)*. Those activities which are recognised as creative are often perceived as non-academic and therefore of less status. The academic subjects are fact-based, with little opportunity for thinking, exploring, discovering alternatives or playing with ideas.

A recent review committee of NPE'86 (1990) reported that the focus of the present curriculum in India is on a narrow segment of the cognitive domain, i.e., memorising facts. The entire curriculum needs to be reorganised to give due emphasis not only to all the dimensions of the cognitive domain, but also to the affective domain and psycho-motor skills (p.299).

The general feeling is that an overloaded curriculum places such a huge load on children that it hinders the development of creative potential. The curriculum hardly offers experiences to explore and manipulate. Instead, it has become unusually cumbersome (Raina, 1989, p.102). A study by Arora, Gupta and Madhulika (1982), describing the curriculum load at secondary level, indicated that in Delhi " the teachers of all subjects have complained that the time available to them for teaching their subjects is short", and those of chemistry, biology and social studies have a general complaint that their courses are very lengthy.

4.4.1 Creativity-Curricular and Extra-curricular activities

Rabindranath Tagore advocated a well integrated curriculum and was against any kind of compartmentalisation. More than mere curricular work, co-curricular activities like music, dance, drama the observance of festivals and the advent of the six seasons, should build character. He envisaged the fullest development of the personality through an education in lines and colours, music and dance, and creative self-expression through various kinds of handicrafts, 'Man's best joy lies in creation, not merely in construction'. So for this free display of surplus energy in man, creative activities should have a

prominent place. It spares education from degenerating into a lifeless bookishness devoid of the joy which should permeate every moment of learning (see *Mukhopadyaya, 1958, p.78*).

The Indian Education Commission (1964-66) emphasised the importance of "co-curricular activities such as debates and dramas which have more of the quality of play than of work and which give greater opportunities for creative self-expression. Every school should organise a variety of such programmes so that every child in it may be able to take up something suited to his tastes and interests" (p.207). Also, Muddu (1981) suggested that the flexible curriculum, democratic administration through students' councils and committees, scientific and recreational hobbies, magazines, drama, writing competitions, painting competitions, debates, poetical symposia and other cultural activities, excursions and tours etc., go a long way to developing the creative potential of children.

A recent experimental study in India by Shan (1992), with a group of students who were taught science using various curricular activities, namely, brainstorming, problem-solving, project and quiz, gained significantly in their verbal fluency, flexibility, originality, elaboration, non-verbal originality, total non-verbal creative thinking and total creative thinking as compared to the group of students taught through traditional lecture methods.

4.4.2 Creativity and status of art education in India

The structure, curriculum pattern and time allocation for the different sub-stages of school education apply in general throughout India (see APP-A2). Of course, there are greater variations in the domain of non-scholastic areas such as work experience or socially useful project work (SUPW); health and physical education, arts, moral education etc. In the majority of schools SUPW and physical education are non-examination areas, but in some states these are treated as subjects for external examination. There are wide variations in the context as well as the status of art in the school curriculum. In some states, only drawing is taught in the name of 'art', while in others music, dance etc. have also been brought under the scope of art (Singh, B. S., 1991, P.10).

Art education, however, remains one of the most neglected areas of the school curriculum in India. At the middle and secondary level, a few schools have introduced some skill-oriented practices in visual and performing arts and crafts which are taught on the basis of strict mechanical rules and copy-work. In fact it is not art, but a "drawing" subject under one of the SUPW activities which are provided in various states' syllabi. Its

various activities like 'object drawing', 'memory drawing', 'scenery making', etc., are the stereotyped art programmes practised in most of the schools. Students are expected to copy the drawing of some objects from the sketches drawn by the teacher on the black-board (Raina, 1989,p.103). The natural flair of the child for creative work is thus crippled by enforcing 'set rules' and 'copy methods' through dubious forms of the 'drawing' subject in schools (p.104).

Developing aesthetic appreciation and creativity through participation in artistic activities is one of the objectives at secondary school level in India. As Raja Gopal (1967) said, the neglect of the arts in education impoverishes the educational process and leads to a decline in aesthetic tastes and values. With regard to co-curricular activities, there are certain activities such as hobbies of different kinds, debates, and staging of plays, all of which have more of the quality of play than of work and give greater opportunities for creative expression (p.47)..

4.5.0 Experimentation and creative work in secondary schools

The Report of the Review Committee on the Curriculum for the Ten Year School (1977, PP 22, cited in Singha, H.S., 1991) suggested that teachers should be made aware of the areas of experimentation which require their creative effort, with help through guidebooks, frequent seminars and conferences. This is essential to foster new ideas and to sustain interest. If teaching conditions are made reasonably congenial, creative and experimental work will develop and thrive.

The committee made further recommendations. (i) Teachers should encourage children's own initiatives, independent inquiry, thoughts and ideas by respecting their humble expression. Also children should be exposed to a variety of situations and materials for keener observation and close analysis. (ii) Books on art, copying from others' art work, colouring books or how-to-do series on art should not be recommended, as they adversely affect the imaginative and creative growth of children by promoting uniformity.

4.6.0. Is creativity found only in some subjects?

To develop creative thinking calls for new ways in which subject matter is to be presented. Understanding that most of the creative - thinking abilities are in the divergent thinking category, the teacher can seek opportunities to call for divergent thinking. The teacher who is alert to opportunities to stimulate creative thinking, whatever the course, can very likely find such occasions (Guilford, 1962). Massialas & Zevin (1967) demonstrated how creative behaviours can be encouraged in the teaching of any subject through the use of open - ended discussions and problem solving.

Opportunities for teaching creative skills are by no means limited to courses in art. Such opportunities are perhaps most obviously encountered in courses in the sciences, in composition and in mathematics (Guilford 1962). According to Fisher (1990) we have traditionally thought of creativity as a function of the arts but not of maths and science. But any activity that involves imagination and originality can be regarded as creative. Maslow (1959) argued that 'a first rate soup is more creative than a second rate painting (p.84)'. Karl Popper (1968) wrote that every scientific discovery contains 'irrational elements' or 'creative intuition'. *Einstein* maintained that the most beautiful thing we can experience is the mysterious. It is the source of all true art and science. Works of art and scientific inquiry are both explorations, looking at different aspects of nature; both require imagination, reason and emotional involvement (Fisher, 1990).

4.7.0 Creativity- Teaching Aids

Spontaneous role-playing provides a common experience for all members of the group and the raw materials for creative production. Torrance (1965) explained that both commercial and home-made recordings can be used for this purpose. Pictures, films, a radio broadcast, a TV programme or similar media are also useful. Foster (1971) pointed out that the use of educational games which call for imaginative and individual solutions has great potential for creative development. Poole (1979) suggested that the teacher should encourage children to play with picture cards, film strips and posters, word play, and imaginative verbal games that stir their imagination *(p.81-84).*

In India, Passi (1989) argued that one should use teaching aids judiciously. Let there be learning which stimulates exploration and creative thinking. Do not let the aids hamper or curb the imagination, curiosity, inquisitiveness of children which are some of the essential components of creative thinking (*p.8).* A recent study of Sudhir Kumar (1992) revealed that exposure to mass media seemed to have a positive significant effect on the creative thinking ability of children. The students exposed most to the media had an advantage over the less exposed students in their creative disposition. The students with literary interests gained superiority in creative thinking when compared to those with social and cultural interests. In India, teaching aids which encourage creativity, are conspicuous by their absence in schools. While advanced countries have their classrooms full of sophisticated gadgets, many schools in India lack even the facilities of good blackboards (Singha, H. S., 1991, p.6).

4.8.0 Creativity - School Examinations

Goodale (1970) argues that traditional exams disembowel creative processes completely, since they usually demand memory processes only and offer little opportunity for divergent production or evaluation. Little wonder that so many teachers complain that students do not think, when as a matter of fact teachers do not ask the kind of questions that require thinking or give the student time to do so if s/he does have the opportunity. Rowe (1974) found that teachers typically wait 1 second or less where the time required to respond after being asked a high level question is 3 to 5 seconds.

In India, the total teaching and learning perspective in schools is stereotyped and vitiated by excessive emphasis on rote-learning at the cost of real understanding (Singha, H. S.,1991). The focus seems to be passing the examination rather than acquisition of proper skills, knowledge, interests, attitudes and habits. The main method used in schools is 'chalk and talk', with the result that the involvement of children remains limited and they do not develop a spirit of enquiry and scientific attitude. The great emphasis on convergent thinking leaves hardly any scope for independent thinking and judgement (p.6).

Arora, Gupta and Madhulika (1982) reported that the academic situation is characterized by the predominance of examinations, with test results as the main objective in schools. "The basic orientation of teachers' teaching is to prepare students for the annual examination. The results also confirm that the amount of homework assigned by the teachers far exceeds the limit of the optimum desirable time for homework. In fact, with so much strain on the child, there is hardly any scope left for him to develop creative capacities. The curriculum smothers creativity rather than developing it".

In this context it is worth quoting comments from the Secondary Education Commission (1952-53, p.147):

> "the examinations today dictate the curriculum instead of following it, prevent any experimentation, hamper the proper treatment of subjects and sound methods of teaching, foster a dull uniformity rather than originality, encourage the average pupil to concentrate too rigidly upon too narrow a field and thus help him to develop wrong values in education. Pupils assess education in terms of success in examinations. The teachers are forced to attend to what can be examined; and to do that with success they often have to 'spoon-feed' their pupils rather than encourage habits of independent study".

The Government's document on policy perspective in education (1985, p.9) also blamed the examinations:

> "no description of the contemporary educational scenario can be complete without a reference to the examination system since it decides, not only the fate of students, but also the content, orientation as well as the quality of education at all levels. Apart from evaluating examinees on the basis of rote learning and memorising, their annual periodicity creates an environment in which students tend to while away their time for most part of the year and gear themselves to work for the last three or four months. For obvious reasons, lack of continuity in application results in the building up of unbearable pressures at the end of the year, which find expression in boycott of examinations, leakage of question papers, mass-copying, payment of bribes to evaluators and other unethical practices. Consequently, degrees and grades do not generally

command credibility as a whole with the public as well as employers in the public and private sectors, and the whole process of higher education has become warped, disoriented and dysfunctional, producing a large number of unemployable young men and women".

The role of education seems to have become so narrow that all it means is the student answering a set of questions at the end of the year. This attitude of learning by rote starts from school (Raina, 1989). Most Indian teachers believe that fear of the rod or the examination results in more learning. They appear to favour authoritative teaching or learning by authority (p. 8). They believe that this sort of teaching is most effective and economic. The present examinations-whether public or school based-represent the triumph of a distorted view of education, one which sees it as generating a *qualificationist* society-respecting qualifications more than real learning. These examinations influence every aspect of school life, teaching, learning the use of leisure time, and emphasis on co-curricular activities, in fact, the entire personality development of the child (Singha, H.S, 1991, pp.138-39). Almost 10 years later, the situation has hardly changed.

As Agnihotri, et al (1994) suggest, evaluation or assessment should be comprehensive in nature. It involves all aspects of the teaching-learning situation and not just the learner. It should help us to understand both the strengths and weaknesses of the learners and teachers, and plan teaching materials and programmes.

4.9.0 Creative Thinking - Role of the headteacher

The role of the headteacher in fostering creativity in the school is crucial. An attitude of flexibility in the administration of time schedules, space factors and implementation of the curriculum as well as an interpretation of curricular requirements is essential to the success of developing creativity (Gulati, 1995). Opportunities and resources need to be provided for teachers and pupils to go on excursions or to visit exhibitions or field trips to enrich their knowledge and experience of the world outside the school in relation to what they learn within a classroom.

The headteacher plays a vital role as an academic leader and reformer at the school level. S/he should have both teaching competency and administrative abilities. S/he has to be an effective functionary, s/he must be a working example to his assistants. It is essential that s/he must teach, however minimal the quantity may be. Otherwise the teachers may comment behind his/her back. "S/he gave up teaching years ago. S/he dare not step into a classroom and give a lesson. How can s/he come and tell us what we should teach or how we ought to teach?" (see Raja Gopal, 1972).

The headteacher who is open minded and innovative, shows initiative, and is sensitive to problems, through knowledge of the school environment can nurture creativity

within the school in the teachers and pupils. According to Passi (1989, p. 11), the atmosphere in the school influences the creativity of the child. The interaction of the teacher with the principal develops this atmosphere. In order to have a good atmosphere in the school, the principal can:

- Provide easy access to the teachers and students
- Focus the work according to the capacity of the teachers.
- Recognise and appreciate the potentialities of teachers.
- Be sensitive to the problem of the teachers.

Torrance (1962, p. 206)) suggests that the school principal can help in guiding creative talent in school: He can: 1. let teachers know that he respects creativity and creative teaching; 2. use some regular system for obtaining teachers' ideas and tolerate disagreement with his own ideas; 3.encourage experimentation and avoid loading teachers with too many extra duties; 4. make the school atmosphere an exciting, adventurous one; 5. make it easy for the new teacher to generate new ideas and stimulate the staff; and 6. maintain frequent communication with individual teachers but let them make most decisions alone.

4.10.0 Summary and Conclusions:

The school is the catalyst for talent identification and development. It should provide a supportive and stimulating environment, and a free atmosphere for fostering creativity among the children. The curriculum does not mean only the teaching of academic subjects traditionally. It should include activities which enable the child to exercise his creative abilities. Cross-curricular activities like music, dance, drama, debates, excursions and tours etc., are helpful in developing creativity among students. Art education is one of the most neglected areas of a school curriculum in India. The emphasis on examinations stresses convergent rather than divergent thinking. The curriculum and examinations appear to influence children's creativity. The headteacher also appears to be influential in relation to the kind of environment generated in the school. However, a number of questions remain to be asked.

1) What are the inhibitors to creativity in government schools in India?
2) Is the present Indian curriculum at secondary stage suitable for the development of creativity?
3) Is there any room for the development of creativity in the present examination system?
4) What types of activities (curricular and non-curricular) are organised by the government schools as a whole to promote creativity among the students?

Chapter V

Creative Thinking and the Teacher

5.1.0 Introduction

This chapter focuses on the role of the teacher in fostering creativity among school children. It considers on how a teacher can encourage creativity, teachers' classroom questioning, and teachers' knowledge and understanding of creativity. Empirical studies on teachers' views and attitudes towards creative teaching and learning will provide a background for understanding the present status of research in the field of creativity.

5.2.0. Creative thinking - role of the teachers

Teachers need to teach their students how it is possible to reapply, transform and reshape techniques and pieces of information which can then be applied to new situations for which they were not originally intended. A given question often has many answers and it is possible to react to the same situation in a variety of ways. Major goals of classroom instruction should be to encourage children to recognize new possibilities for solving problems and actively to seek alternative solutions. McLeod and Cropley (1989, p.177) emphasised that such a policy has implications not only for students but also for teachers, who can no longer function as the single source of all wisdom, dictating what is relevant and what is not, and making all judgements about quality, but must be willing to depart from the lesson plan, to look at answers which are not in the textbook and so on.

Hildreth (1966) highlights the role of the teacher as *mentor:* one who excites the student and makes him / her want to keep on exploring even after the closing school bell rings (pp.470-71). The teacher's primary goal is not to impart information, but to show the student how to learn as he responds to thought provoking problems (p.223). Wallace (1986, p.76) says that, the teacher is the guide, the prompter, and the change-agent. The teacher opens up new avenues of interest, demonstrates new techniques of working or performing, shows how great minds have thought, and helps the child to evaluate his work.

The teacher serves as facilitator rather than director of learning (Rogers,1959;78-79; Wallace,1986, p.72). To facilitate learning the teacher must be a genuine human being, must be able to interact with children in such a way as to demonstrate human concern, must build a relationship of mutual trust with students and must demonstrate empathic understanding in

dealing with children.

According to Duric(1989) teachers must also learn to be creative in their educational activity. If the teachers are not creative, it is not possible to them to develop the pupils' creativity. The educational process in school is a bipolar process. One pole is formed by the teacher, the other by the pupil. There should be an interaction between them; they should influence each other mutually.

According to Torrance (1963), the creative classroom is an ideal centre, a place where students and teachers are excited about learning and open to experience, where there is respect for the individual student and his ideas. Such felt respect from an authority figure fosters self-respect and self-discovery in the student. As Raina (1989) argues, the classroom has to become a place where the exciting experience of exploring and discovering meaning is the central activity. This obviously will give the student a chance of holding and presenting his meanings without ridicule or attack, and the privilege of seeing things the way he does, according to his own intellectual cognitive style (p.137).

The teacher is responsible for the child's working environment and must see that there is a good deal in it likely to stimulate and interest in children (Dean, 1976). S/he must also take children out of school or stir and stimulate them through discussion or stories, or pose questions or problems, so that they are motivated to create. S/he must take children's ideas seriously and when time allows, talk with individuals in the attempt to discover how they see what they are doing. As Goodale (1970) recognised, the teacher's success or failure lies in his capacity and ability to reach, catch and promote potential creativity in pupils. He has to identify this creativity, reach it, and provide a congenial environment and a warm and friendly atmosphere that promotes creativity. Teaching can play a pivotal role in shaping children's creativity.

Freire (1972,p.58) characterizes much teaching as "... an act of depositing in which the students are the depositors and the teacher is the depositor...". Such a teaching method, adds Freire, forces students to be the patient receivers of deposits by their teachers, deposits which they are expected to memorize and repeat.

But creative teaching is always constructive. Rote memory and blind imitation are not encouraged, whereas special emphasis is laid on independent thinking. Imitation is the greatest enemy of creativity. Efforts need to be made to ensure that students do not remain passive listeners but are active. In place of obedience and conformity, qualities like self-confidence

and originality are inculcated in the students. In addition, they are alerted to current problems, and efforts are made to develop an experimental attitude in them so as to enable them to find appropriate solutions to problems. For this, the teacher will have to understand the characteristics of creative children, so that he can identify such children and help them in cultivating their creative potentialities.

5.3.0 What Is the Teacher's Role in Fostering Creativity ?

Teachers who wish to foster creativity in children must discover the individual child's interests and talents and establish an environment that promotes their expression (Hill, 1992; Wallace, 1986, p.76). Teachers should develop a sensitivity to observing traits that indicate creativity. These traits include flexibility, originality, openness, risk-taking, curiosity, imagination, independence and tolerance of ambiguity (Hill, 1992).

Torrance (1968,1970,1975; Torrance and Myers, 1974) in a series of studies, and other creativity-oriented educators *(Barber and Holden, 1977)*, suggested the following ideas for fostering creative thinking and originality among children: respecting children's right to initiate their own learning efforts, questions and ideas; taking time to plan for imaginative activities; holding free-wheeling discussions, brainstorming sessions and sharing with students one's own activities involving aesthetic and creative expression; encouraging children's awareness and sensitivity regarding environment stimuli.

Bjerstedt's (1976)-survey research project studied creativity in schools, one of the aims being a survey of the opinions of teachers on how to promote creativity in schools. The project included an unstructured survey of the views of about 300 people, a structured survey of the opinions of 350 people[1] and classroom observations. One of the main findings was that it is possible to stimulate aspects of creativity by fairly simple means, using specific types of study materials. *Bjerstedt and his colleagues*[2] found that the teachers tended to define creative ability in terms of "independent work", "richness of ideas", "originality" and "the ability to combine".

According to Poole (1979,P.12), there are at least four important roles which the teacher can play in fostering creativity in children. The first relates to ***teacher attitudes***. An open, receptive and accepting attitude by the teacher is indeed very important if creativity is to thrive and flourish in classrooms. Secondly, ***Classroom organisation***. Some children tend to be boundary-breakers and produce more creative responses when they are forced to break

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1 "key teachers" consultants or planners of in-service teachers training

through old conceptions and ideas in order to find newness. The astute teacher therefore looks across curriculum boundaries to patterns of organisation that are sufficiently diverse to enable children's creativity to be given organisational support, as in learning experiences, materials, setting within groups.

Thirdly, the teacher can be seen as the ***constructor of curriculum experiences***. If traits such as imagination, curiosity, a quest for novelty, and inventiveness are to be developed, the construction of appropriate curricular experiences by the teacher is of vital importance. Fourthly, the teacher has to be able to ***recognise originality and reward it***. Children can become hostile if all their 'creations' are highly evaluated by the teacher. Self-monitoring is to be encouraged; the teacher must nonetheless select the creative products of a child's output which can be objectively as well as subjectively evaluated.

According to Powell Jones (1972, p.24) the teacher needs to become a fully original, thinking, functioning personality, with an active awareness of divergent learning experiences, and flexibility in his/her thinking and methods. Cropley (1967) argues that teachers who have more knowledge of divergent thinking and associated concepts subsequently permit a higher level of creativity in their students, even if they make no special and conscious effort to encourage it. Patterning or modelling of creative behaviour on the part of a teacher, then, is a potent factor in fostering creativity in students. According to Alencar (1993, p.94) "teachers agree on the importance of fostering creativity but in general, teachers do not offer adequate conditions for the development of creative capacity".

5.4.0 Who is the CreativeTeacher?

The research evidence suggests that a creative teacher maintains a dynamic balance which demands alertness, perception, and critical thinking while teaching in a way which involves the full use of the intellect, emotions, the senses and intuition. S/he is often non-conforming, independent, and questions traditional practices (Wallace, 1986, p.73). S/he encourages and facilitates creative development and functioning among his pupils. S/he is a humanist and an honest, trusting person (Torrance and Myers, 1974, p.317). The creative teacher can create opportunities for creativity through arranging activities. e.g. field trips, special days, pictures, dramatizations, pets and animals, and growing plants. The creative teacher causes ideas to develop, and these ideas can become the substance of the creative

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2 Ibid

productions of children (Torrance, 1965, pp. 304*)*.

According to Hallman (1967, pp. 327-330; 1971, pp. 220-224*)* the creative teacher provides for self-initiated learning and sets up a non-authoritarian learning environment. If the teacher is authoritarian s/he discourages decision-making on the part of pupils. The creative teacher encourages creative thought processes. S/he stimulates pupils to seek for new connections among data, to associate, imagine, think up tentative solutions to problems at hand, make wild guesses, hitchhike ideas, build on the ideas of others and point these ideas in new directions. S/he allows students to take intellectual risks, to speculate on the basis of inconclusive information, to probe for structural and spatial relationships among things.

The creative teacher also promotes intellectual flexibility, encourages self-evaluation of individual progress and achievement, helps the student to become more sensitive to the moods and feelings of other people, to all external stimuli, and social and personal problems as well as academic ones, to public issues, and even to the commonplace and the unknown.

To encourage divergent thinking, a creative instructor will maintain an easy willingness to consider any question, any topic, any time. Thus, a good teacher is seen by his students as a "creative observer" (Hughes, 1969), according to Eric Barnes (1956*)*, who describes one from a student's view point: "He is perceptive, kind, appreciative, sometimes critical, but always detached. When he is on the sidelines, one's task immediately takes on new meaning and dignity".

According to Cornelius and Casler (1991*)* a creative teacher provides opportunities for students to explore and manipulate a wide variety of materials, props and ideas. S/he also provides for self-initiated learning and activity on the part of the child and gives "think" time to the child so that they can reflect and make choices that are fun and meaningful *(p.103)*. The research literature supports the position that creativity indeed can be taught, but that it cannot be taught by the traditional, authoritarian methods. Creative procedures cannot be prescribed nor can they be written into lesson plans; yet creative teaching is the best way, perhaps the only way, to promote creative behaviour on the part of pupils (Hallman, 1971, p.327).

5.5.0 Non-Creative teachers

The non-creative classroom by comparison is one in which the teacher is authoritarian, rigid, dominated by time, insensitive to pupils' emotional needs, unwilling to give of themselves, preoccupied with discipline and the giving of information (Wallace,1986,p.72*)*. A non-creative teacher becomes a giver of knowledge rather than a motivator of learning

(Singha, H. S., 1991). An insecure teacher who uses his position of authority to bolster his ego is not likely to welcome the challenges posed by creative thinking. He is apt to interpret the creative student's questioning, doubting and challenging as insubordination, where as a teacher must be able to gain satisfaction from a new idea created by one of his students (Sanders, 1966, P.137).

5.6.0 What can teachers do to develop creativity?

Creativity in recent years has become an ideal of democratic living and institutions. Strongly supported by humanistic psychologists is the assumption that all people have creative potential, so the challenge for society and schools is to develop methods for releasing and developing their potential. Many researchers see creativity as a 'complex set of human attributes which can be enhanced by deliberate efforts' (Amabile, 1987; Parnes, 1987; Torrance,1987).

Creativity-oriented educators, Torrance and Myers (1974), have argued that creative behaviour does not have to be left to chance. They describe some deliberate, disciplined methods for increasing the chances that creative behaviour will occur in the classroom (p.100). They emphasise that deliberate methods of creative problem solving tend to increase the chances of finding original solutions. But they argue that other skills are also required for creative problem solving, such as accurate observation and awareness skills, questioning, maintaining ideas, and predictions (p.83).

According to Foster (1971), "the teacher is a crucial factor in nurturing creative responses. Much potential is only realised if the teacher is able to recognise creative behaviour, and is subsequently sympathetic towards it and makes active efforts to cater for it and encourage it" (p.157). This will probably best be accomplished in an atmosphere where the individual is respected and genuine participation is encouraged, the teacher joining in and carefully guiding the pupil's thinking so that further original ideas are the outcome. A most important factor in encouraging children to use their creative abilities is that the teacher should really believe that all pupils are capable of achieving a high level creative functioning. In psychological terms, 'teacher expectation must be high' (Foster, 1971, p. 38).

Cropley (1982)[3] identified two basic underlying principles: acceptance and acknowledgement. Acceptance involves a willingness on the part of teachers to take seriously

3 Cited in Mc Leod and Cropley (1989).

ideas which depart from the everyday or conventional. Acknowledgement requires teachers not only to tolerate the efforts of highly able children but also to make it clear that they welcome such efforts and regard them as important, necessary and praiseworthy.

Freeman, Butcher and Christie (1968) conclude that 'creative development can be enhanced through the use of discovery methods'. They emphasise that school and home environments should give 'free rein and a ready response to the explorations of the child'. Mc.Leod and Cropley (1989) argue that teachers can often help children by giving everybody a chance to speak up in class and avoiding hurting people's feelings (p.178). The teacher is expected to respond to the creative needs of the learner, know the learner, build creative skills, and go beyond textbooks, classrooms, and curricula (Torrance, 1970). There is an essential tension in the curiosity and search for the truth that characterises creative learning. Much more than a permissive environment is necessary. Teaching in creative ways "requires involvement and commitment- the most sensitive and alert kind of guidance and direction, absorbed listening, fending off disparagement and ridicule, and making honest efforts seem worthwhile enough to assure continued effort" (Torrance and Myers, 1974, p.13).

The research indicates that the following are positively conducive to creative functioning.

- Help children become more sensitive to environmental stimuli and acquisition of knowledge in a variety of fields (Torrance, 1962b). Avoid over-emphasising textual information. Whenever possible provide for supplementary material, books and other experiences (Passi, 1989).
- Provide stimulation to promote creative learning by students. Creative learning involves skills of inquiry, research and problem solving. Here, the learner raises questions, makes guesses, tests the guesses, corrects errors and arrives at conclusions (Passi, 1989). Encourage experimentation and spontaneity. Make available resources for working and encourage manipulation of objects and ideas (Torrance, 1962a).
- Encourage or reward or respect creative effort in the form of unusual and imaginative ideas. Appreciate openly whenever a child expresses creative behaviour like asking unusual questions, giving an unusual idea, taking self-initiated actions etc. It is not always necessary to reward only the expected answers (Torrance, 1962a and 1965; Wallace, 1986; Passi, 1989).
- Encourage the habit of working out the full implications of ideas and develop skills of constructive criticism and encourage self-evaluated and self-initiated learning (Torrance, 1962b; Wallace, 1986). Encourage children to pursue their hobbies. Discourage rote learning or memorisation of facts by children (Passi, 1989).
- Develop a creative classroom atmosphere (Torrance, 1962b). Do not make sarcastic and insulting remarks about children. Such remarks create a threatening atmosphere in the classroom. Remember that the classroom atmosphere should be stimulating and responsive (Passi, 1989). 'Efficient organisation' in the classroom will be concerned with basic order and routine. The organisation of pupils' learning will be extremely flexible, allowing individual choice, discrimination and judgement (Foster, 1971).

- ☞ Show your pupils that their ideas have value (Torrance, 1962a and 1965). A good pupil – teacher relationship is essential (Wallace, 1986; Foster, 1971). Use of humour releases creative thinking (Wallace, 1986). The teacher must be a good listener, receptive to ideas, able to respond positively and build up the self-concept. Group activities and competition should not be used as the main spur to effort (Foster, 1971).
- ☞ Allow children to pursue as much as they want without bothering themselves about giving the expected solution or answer (Passi, 1989). Allow pupils do something "for practice" without the threat of evaluation (Torrance, 1962a and 1965).
- ☞ Avoid telling pupils everything and do not insist on correct answers. Allow the child to think and express freely and explore facts for themselves wherever possible between do their best without giving hints for the solution (Passi, 1989). Begin from where the pupils are, not where the teacher thinks they ought to be. Let the pupils go to where they want rather than where the teacher thinks they ought to go. Problems should be given which can be solved in groups. Collaboration is important and often gives rise to new ideas that can be developed by individuals. A team-teaching approach is likely to be fruitful. The team could profitably include students, aides and auxiliaries (Foster, 1971).
- ☞ Brainstorming stimulates creative thinking. This can be a group or an individual activity (Wallace, 1986; Foster, 1971). Imaginative and supervised creative activities might foster the development of creative imagination better than undirected freedom of action (Markey, 1935; Mock, 1970).

A study by Wodtke (1963,1964 and 1965) used a creativity test to examine residual gains of pupils over one school year in classes of highly controlling[4] as compared to low controlling teachers[5]. The results reveal that the pupils of low controlling teachers achieved higher gains on verbal creativity, verbal fluency and flexibility and the pupils of the high controlling teachers achieved higher gains on non-verbal elaboration. Wodtke's experimental studies concluded that the pupils of highly controlling teachers exhibit less self-initiated verbal behaviour, and achieve lower gains on measures of verbal creativity than those of more permissive teachers (Ibid, p.62-63). In particular, it has been argued by Torrance (1962a) that directive teaching practices do not provide an optimal environment for encouraging creativity, and that such environments may in fact suppress the development of creative abilities. According to this point of view, the classroom behaviour of highly creative students may conflict with the practices of highly directive teachers.

5.7.0 Creativity - Teachers classroom questioning behaviour

5.7.1 Importance of open-ended questions

Questioning is the most common communication behaviour used in teaching. Teachers use questioning strategies to review, to check on learning, to probe thought processes, to pose

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4 Pupils work strictly as directed, they do not choose assignments, movement and inter-pupil communication is controlled by the teacher, and whatever happen is done with the consent of the teacher.

5 Permits pupils to move around and interact freely, gives considerable choice in assignments, asks the pupils to express their own opinions and plan the work on their own.

problems, to seek out alternative solutions, and to challenge students to think critically and reflect on issues or values they have not previously considered. It is not surprising that questions have been labelled as "the single most influential teaching act" (Taba, Liven& Elzey, 1964)

Landau (1985, p. 379-80), rightly explained the importance of questioning behaviour 'By encouraging questions, we can help keep children's nature curiosity alive, stimulate their imagination and sense of adventure, and at the same time keep the learning process enjoyable. Once children enjoy learning, they become more involved in the subject, and venture to ask questions; all of which leads to its continuing enjoyment and progress. Though obviously we can't assist children with knowledge of the future, we can help them acquire the mental means to deal with it more effectively'. Further, Landau says, questioning pushes an individual's present knowledge to its limits so that he has to think again, thus challenging his potential, and the greater the potential, the more powerful the challenge must be to be effective. Landau argues that it is important, though, to teach children to ask questions which are not based only on passively accepted knowledge, but which are dynamic and future-oriented. Such questions will help to close the gap between what is studied by the child today and what will be needed by the adult.

Every creative act begins with questions, but the questions must be operational[6] and open-ended[7]questions. Questions which are settled by citing already known facts hinder creativeness and restrict discussion. They hinder creative efforts because they make information a tool by which the teacher dominates rather than one which makes for inquiry and discovery (Hallman, 1967 & 1971). One of the most gratifying results of open-ended questioning is that pupils discover that they have worthwhile ideas. These questions not only stimulate free-thinking but also secure the participation of many children (Passi, 1989, p.8). Open-ended questions that feature original thinking can do a great deal for a child's self-concept, and they can also help the teacher (Torrance and Myers, 1974, P.194). Open questions allow children to voice their own ideas and encourage children to get involved in the process of investigation (Craft, 1997, p.47).

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6 Operational questions initiate the creative endeavour because they lead to exploration; they foster curiosity and stimulate connotative tendencies.

7 Any question that invites a great diversity of responses or divergent thinking. Open-ended questioning involves the pupil in thinking of possible and going off into different directions to find an answer, instead of striving for one "correct" or "accepted" answer.

5.7.2 What research says about the usage of open-ended question by the teachers

Research (Gall, 1984; Hare & Pullman, 1980) has demonstrated that 80 percent of questions used in classrooms ask students to do something other than think (60 % require recall; 20 % are procedural). The findings of a classroom observation study by Bjerstedt and his colleagues (1976) on thought processes showed that processes were reproductive (66.4%), convergent (24.9%), divergent (3.9%) and evaluation (4.8%). The lessons were heavily teacher-dominated, student initiatives only comprised about 8% during an average lesson (p.8). Also, the research of Cunningham (1987) has shown that only 5% of the divergent questions used in the classroom.

Ellis (1993) claimed that h*igh-divergent questions*[8] encourage creative thinking. Further, research has indicated that in order for students to benefit from high-level divergent questions they need the freedom to generate unique, new, or imaginative ideas. Thus, an atmosphere where there is opportunity to explore a variety of ideas without constraints or pressure to give "correct" answers is required (Sund & Carin, 1978). Students may be required to elaborate, make divergent associations, point out implications, or do open predicting

Provocative questions improve the quality of pupils' learning (Torrance and Myers, 1974, P. 219-220). Studies of classroom behaviour, unhappily, indicate that provocative questions are rarely asked at any level of education. One study (Fowlkes, 1962), for example, showed that over 90 percent of the questions asked by junior high school social studies teachers call only for the reproduction of textbook information.

5.8.0 Instruction for Creativity-Teachers Knowledge and understanding

For the teacher who is concerned about promoting creativity in students, a knowledge of the various abilities contributing to creativity may be important. If we wish to develop certain skills, it is very important to have knowledge of the nature of those skills. Unless we know what a skill is like we do not have a very clear goal at which to aim (Guilford 1962). Alencar (1993, p. 95) indicates that some teachers are not aware of techniques such as brainstorming, synectics, and attribute listing, which can promote creativity.

Williams (1966a) administered a questionnaire to more than five hundred teachers across the United States just beginning training. He reported that these teachers did not understand what was meant by the term 'creativity' and that they had difficulty in identifying

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8 These questions have students formulate generalisations and give diverse, Original, or novel responses.

creative talent in pupils. This study was replicated by Eberle (1966) and reported the same results. Abraham (1966) also reported that many teachers do not understand and are not prepared to cope with scholarly discussion of convergent and divergent thinking and complex concepts of pupils' intellectual abilities.

In India, Raina and Raina (1981, p.103-08) studied 45 teacher educators' knowledge of research findings and materials on creativity. They used the 'Information awareness checklist'[9] which was developed by Williams (1966a). The study revealed that they were most aware of the need of creativity for their classroom teaching to have innovations, and had a desire to have their pupils to think divergently and expect pupils to be creative at the same time as learning subject-matter content. The results also revealed that by and large the teacher-educators did not possess sufficient knowledge or were not sufficiently aware of the creativity and creativity movement in the field of education and psychology.

Wallace (1986, p.71) has also argued that although theories of creativity abound, teachers are still no nearer to understanding what creativity actually is nor what the creative process is. We are still a long way from understanding the basic mechanisms of thinking, to say nothing of the complex process of creativity.

5.9.0 Creative thinking – Teachers' Views and Definitions

Just as studies of teacher's views of creativity seem to be quite rare, so do research reports on creativity from Eastern Europe. However, Popescu-Nevianu and Cretsu (1986)[10] combine these two elements in a study of Bucharest maths and Latin teachers. This explores the teachers' attitudes to innovation. The number of respondents is not stated, but we are told that their combined experience amounts to "up to five hundred years". This research reveals an interesting paradox in that the Romanian teachers did not value initiative in them-selves, but valued it highly in others. Indeed they appeared to be modest, have poor self-concepts and prefer traditional teaching styles.

In the most comprehensive British study by Fryer (1989), the teachers were asked to tick every item listed in a given table which matched their view of creativity. Results indicate that the most teachers see creativity mainly in terms of Imagination (88.7%), originality (80%) and self-expression (73.7%). Only half the sample regards divergence (50.8%) as synonymous

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9 The checklist includes questions on tests and teaching materials by Torrance; Guilford model, Bruner and Bloom; on reports of Piaget's findings and general questions about divergent and productive thinking.
10 Cited in Fryer and Collings (1991) and Fryer (1996)

with creativity. Furthermore, the convergent process involved in creative thinking is not much acknowledged. Only 10.2% think that convergence accords with their view of creativity. The study revealed that the factors most assisting the development of creativity in the teachers' view were building pupils confidence, encouraging pupils to ask questions, a creative teacher and some free choice at home. The major obstacles perceived by the teachers were inadequate resources, inadequate preparation time, over-large classes, excessive teaching and non-teaching workloads, and unsuitable accommodation.

5.10.0 Creative thinking – Teachers' attitude

Torrance (1965) used his Ideal Pupil checklist to explore the attitude of over a thousand teachers from the United States, Germany, India, Greece and the Philippines (see table-5.1). He concluded that teachers in all five cultures valued the creative child insufficiently. They may be unduly rewarding courtesy, doing work on time, obedience, popularity and willingness to accept the judgement of authorities. However, there have been replications of this study by *Raina and Raina (1971)* with one hundred teacher educators (male=84 and female=16, avg.age=36 years) of the State of Rajasthan (India) and *Ohuche (1986)* with Igbo (minorities) teachers (male=72, female=55; avg.age=30 years; avg.exp=7.1 years) in Nigeria. The results of both studies show that teachers attach a great deal of importance to industriousness, sincerity, obedience and meeting deadlines. The same attitudes held by the Indian teachers was reflected in the study of Torrance (1965). Ohuche argues that the Nigerian educational system is highly competitive and examination results oriented so the teachers strive to prepare students to excel in examinations. As is the custom in their culture, conformity, obedience and consideration for others are required (p.192-194). Similarly, Raina and Raina argue that the system of education in India is greatly authoritarian and traditional. The society is conservative and authoritarian, and obedience and sincerity are demanded. The creative person must be open to new ideas, but must examine everything before he accepts it as his own. This quality of intellectual honesty, sincerity and independence is not compatible with a conformist society dominated by external examinations. This intellectual quality will bring the individual into conflict and make the creative child isolated (Raina and Raina, 1971, p.305).

A very recent study in the UK, *Fryer (1996)*[11] used a sample of 1028 teachers drawn from 57 schools (school teachers N=792, male=229, female=563 and 24 incomplete), and colleges (education lecturers N=207, male=87, female=120) in the United Kingdom. The study

Table 5.1 : The most favoured characteristics by various cultural groups in different studies.

Studied by		Torrance (1965)					Raina & Raina (1971)	Ohuche (1986)	Fryer (1996)
Sample drawn form		Teachers					Teacher Educators	Secondary School teachers	School & college teachers
Sample Size (N)		264	94	375	94	147	100	127	1028
S.No	Characteristics	US	Germany	India	Greece	Philippines	India	Nigeria	UK
1	Adventurous	-	10	-	-	-	-	-	-
2	Affectionate	-	-	9	-	10	-	8	-
3	Altruistic	-	-	-	8	-	-	-	-
4	Attempts difficult tasks	-	5	-	-	-	-	-	-
5	Considerate of others	4	-	-	-	5	2	4	1
6	Courteous	-	-	4	10	3	5	7	-
7	Curious	2	7	1	-	-	9	-	5
8	Determination	7	-	10	-	-	-	-	-
9	Does work on time	-	-	3	-	6	6	-	-
10	Energetic	-	-	-	1	-	-	-	-
11	Healthy	-	9	5	7	4	-	6	-
12	Independent in judgement	-	6	-	-	-	-	-	-
13	Independent thinking	1	4	-	-	-	10	-	4
14	Industrious	5	3	8	-	1	1	1	-
15	Non conforming	-	-	-	5	-	-	-	-
16	Obedient	-	-	2	-	2	4	3	-
17	Receptive to other's ideas	6	-	-	-	-	3	-	-
18	Remember well	-	-	-	6	8	-	-	-
19	Self confident	-	-	6	9	7	-	5	3
20	Self-starter	8	8	7	-	-	-	-	-
21	Sense of humour	3	2	-	-	-	-	-	-
22	Sincere	9	1	-	4	-	8	2	-
23	Socially well adjusted	-	-	-	-	-	-	-	2
24	Strive for distant goals	-	-	-	2	-	-	-	-
25	Thorough	10	-	-	3	-	-	-	-
26	Well liked by peers	-	-	-	-	-	7	-	-
27	Willing to accept judgements of authorities	-	-	-	-	9	-	-	-

was designed to provide a comprehensive map of teachers' views on creativity, together with a more detailed investigation of the views of a representative sub-sample. Following unstructured exploratory interviews and pilot work, a teachers' questionnaire was devised

11 More details and results were reported in Fryer (1996) and Fryer and Collings (1991)

which every respondent completed. The teachers were asked to identify the five characteristics that they most valued and the five they least valued (see table-5.1 & 5.2). The five most highly rated characteristics were consideration for others, being socially well adjusted, self-confidence, independence in thinking and curiosity.

Despite the above results, the British teachers seemed more willing to encourage creativity than those involved in earlier studies (Fryer, 1996, p.62). Fryer quotes some examples from her study of what teachers said: 'I try to be a creative teacher; I would like to be one; my goal for the children is self-sufficiency'.

For the characteristics which teachers should discourage (see table-5.2) all the cultures agreed they included disturbing classes/ organisation, domineering (except India and Philippines) and faultfinding (except Greece and UK). The characteristics exclusive to the Indian teachers were being critical of others, liking to work alone, regressing, being a good guesser and always asking questions (table-5.2).

Table 5.2 : The least favoured characteristics by various cultural groups in different studies.

Studied by		Torrance (1965)					Raina & Raina (1971)	Ohuche (1986)	Fryer (1996)
Sample drawn form		Teacher					Teacher Educators	Secondary School teachers	School & college teachers
Sample Size (N)		264	94	375	94	147	100	127	1028
S.No	Characteristics	US	Germany	India	Greece	Philippines	India	Nigeria	UK
1	A good guesser	-	-	-	-	-	6	-	-
2	Always asks questions	-	-	-	-	-	9	-	-
3	Bashful	-	-	-	-	3	8	2	-
4	Critical of others	-	-	-	-	-	4	-	-
5	Disturbs classes	4	1	1	5	2	10	9	4
6	Domineering	2	5	-	4	-	-	3	5
7	Faultfinding	5	2	2	-	5	5	4	-
8	Haughty and self-satisfied	1	4	-	1	-	-	-	2
9	Like to work alone	-	-	-	-	-	1	-	-
10	Negativistic	3	-	-	2	-	-	5	1
11	Non-conformist	-	-	-	-	-	3	1	-
12	Regressive	-	-	4	-	-	2	-	-
13	Stubborn and Obstinate	-	-	5	-	1	-	7	3
14	Talkative	-	3	3	-	2	-	8	-
15	Timed	-	-	-	3	4	7	6	-

As teachers consistently evoke attitudes and reactions in students which are similar to their own attitudes (Tausch, 1960), it is vitally important for the beneficial growth of the child that the teacher's attitude be favourable (Mirman, 1964). Torrance (1965) demonstrated that a positive attitude to creativity among teachers fosters creativity in pupils.

It is generally believed that the favourable / positive attitude of teachers towards creative children's learning and teaching plays a vital role in promoting creativity. Unfavourable or negative attitudes of teachers will depress the children's creative thinking (Sing and Das, 1989, p.120). Singh (1985) has found unfavourable attitudes of high school teachers towards creative learning and teaching.

Again the same researcher (Singh and Das, 1989) attempted to assess the attitude of teachers of 60 pre-higher secondary i.e. primary and junior high school teachers, 60 higher secondary teachers and 60 post-higher secondary, teachers i.e., first degree and Postgraduate teachers towards creative learning and teaching. The purposive sampling technique was used to select a sample. The revised 50 items scale entitled "opinions on creative learning and teaching" developed by Torrance and Phillips (1972) was used to assess the attitude of the teachers, irrespective of their age, sex, teaching experience etc., two junior high schools, four higher secondary schools and two Postgraduate colleges of Agra city (India).

In this study all the teachers have favourable attitudes towards creative learning, but unfavourable attitude towards creative teaching (except in the case of post-higher secondary teachers). They conclude that teachers wish their pupils to learn creativity but they do not like to teach pupils in a creative manner. It shows that either they do not know creative methods of teaching or do not have the will to teach creatively. In the case of post-higher secondary teachers, they may have favourable attitudes because they recognize the worth of creativity in education.

5.11.0 Training in creativity

Treffinger, Ripple and Dacey (1968) studied teachers' attitudes to creativity with their 14-items survey instrument[12], which was administered to teachers and administrators (N=250) from public and parochial schools of New York city. They conducted an in-service programme

12 There were 14 items on the attitude survey instrument, 11 items were presented as statements, to which the respondents indicate agreement or disagreement on a 5-piont Likert-type scale (Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree), the other three items were to evaluate the truth of a statement, rather than agreement or disagreement, using a similar 5- point scale.

(for four days) on creativity[13] as a treatment in their pre and post-test design. The results reveal that in-service education programmes in creative problem solving made a valuable contribution to the professional development of participants; facilitated teachers' ability to identify creative pupils; and increased understanding and more favourable attitudes about creative problem-solving abilities.

An attempt has been made by Tan-Willman (1981) to determine the attitudes of Canadian student teachers (33 male and 101 female) to creativity. The same 14-items instrument of Treffinger, Ripple and Dacey (1968) was used, but only 11 items were presented to the respondents to indicate their agreement on a 5-piont Likert-type Scale. The results reflect more favourable then unfavourable attitudes toward creativity. Although the respondents agreed to the need for teaching creative thinking and to the notions that many of us possess creativity and that pupils' ability to think creatively and to solve problems can improve through direct instruction, they are not quite decided whether creative people are born, not made, and whether it is wise or necessary to teach children to become more creative.

5.12.0 Summary and Conclusion:

It is evident from the above literature that a teacher can promote creativity if s/he is willing to do it. A positive, open, receptive and accepting attitude, a congenial environment, a warm and friendly atmosphere, value given to students' responses, and encouraging self-initiated learning promote creativity in pupils. Teacher disapproval of the classroom behaviour of creative pupils may result in the suppression of such behaviour and encourage pupil conformity. The possibility that creative pupils may become apathetic about school and become classroom behaviour problems as a result of conflict with the demands of the directive teacher has also been suggested (e.g. Wodtke, Torrance).

According to Fryer and Collings (1991a), British teachers see creativity mainly in terms of imagination, originality, and self-expression. Does this definition of creativity apply to all cultures? Does teachers' perception of creative children vary from one culture to another? The present study intends to explore the Indian teachers' definition of creativity and attitude towards its development. What is the attitude of Indian teachers towards creativity and its development among the school children? Do they encourage creativity in the classroom?

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13 Informal discussions and formal lectures (about an hour) on current theoretical approaches to creativity, problem-solving, recent research on creativity in children and adults, and the personality correlates of creative ability. Innovative instructional materials were also demonstrated and discussed.

What are the obstacles they find in fostering creativity?

Chapters II, III, IV and V have reviewed the literature on creativity examining its conceptual development in students, its place in schools and how it is perceived and valued by teachers. This review has revealed that the context of creativity is important in encouraging its development. This has clear implications for education. Research in India has largely neglected the role of schools and teachers in the development of creativity in students. This thesis will attempt to redress this balance.

Chapter VI will explore the methodology which may be appropriate for achieving this end. The specific research questions which are to be considered are:

1.1 What is the teachers' definition for creativity? Do all teachers value creativity?

1.2 Do the teachers think that creative thinking develops through teaching?

1.3 To what extent can Indian teachers encourage creative thinking in the classroom?

1.4 How might teachers develop creativity? What are the problems experienced by the teachers in developing creativity?

1.5 What is the Indian teachers' opinion on the present examinations and curriculum in relation to creativity development?

2.1 Do the students of Government schools differ significantly on measures of creative thinking in relation to their background, organizational, and cognitive and motivational variables?

2.2 What is the students' perception about their teachers' classroom behaviour and their teaching methods?

3.0 What types of activities are organised by the schools in order to promote creativity?

4.0 What is the exploratory model of creative thinking ability?

Chapter-VI

Design and Development of the Research Instruments

6.1.0 Introduction

In this chapter the methodological issues, procedures and processes followed in the development of the research instruments will be explained. The Tests of Creative Thinking (verbal and non-verbal) were constructed and standardised by Mehdi (1973, 1985) in India on rural and urban samples and have been extensively used throughout India. These tests are suitable for secondary school students. Information about and description of all the instruments developed specifically for this study, and translation and back translations are presented in this chapter.

6.2.0 Methodological issues regarding development of the instruments

6.2.1 The Interview as a research tool

Interviewing provides access to the context of people's behaviour and thereby provides a way for the researcher to understand the meaning of that behaviour (Seidman, 1991). The interview allows flexibility in questioning the respondent. It provides opportunity to guide the respondent in his interpretation of the questions (Gorden, 1975).

According to Cohen and Manion (1985) the structured interview is one in which the content and procedures are organised in advance. This means that the sequence and wording of the questions are determined by means of a schedule, and the interviewer is left with little freedom to make modifications. It is therefore characterised by being closed. In contrast the unstructured interview is open, having greater flexibility and freedom.

The chief disadvantage of unstructured responses concerns the matter of quantification. Data yielded in an unstructured way is more difficult to code and quantify than data in a structured response (Cohen and Manion,1985).

In comparison with questionnaire interviews often have high response rates and also they offer the opportunity to correct misunderstandings and to carry out observations and ratings while controlling for incompleteness and for answering in sequence. Interviewers can also often succeed with respondents who have reading or language difficulties. But interviews are expensive and time-consuming to conduct and to process, there are always the risks of

interviewer bias, and interviews are usually too expensive to use with a widely dispersed sample (Oppenheim, 1992, p.102).

6.2.2 The questionnaire as a research instrument

The questionnaire is economic in respect of time and money and can provide a type of anonymity which is not provided by interviews. Respondents with busy schedules may not have time for interviews. A questionnaire is more flexible, giving scope to the respondents to complete it whenever they can. Questionnaires also collect information from a large sample and there is no pressure on the respondent for an immediate answer as there is in interviews.

Of course, devising a questionnaire is not an easy task. Much time is required for designing the questions, making sure the wording is clear, thinking through the categories of response to each question, piloting and re-drafting. *(eg. Munn and Drever, 1990).* Questionnaires have to be composed and piloted, improved and then tried out again, often several times over, until the researcher is certain that they can do the job for which they are needed *(Oppenheim, 1992, p47).*

As *Fowler (1993)* argues, survey instrument design has two components- deciding what to measure, and designing and testing questions that will be good measures. The first step is to define the survey objectives, though those objectives may be revised according to subsequent question testing. Then the process of choosing and testing questions takes place. Fowler also suggests some steps involved in the survey instrument development process:

❶-Focus group discussions
❷-Drafting a tentative set of questions into a survey instrument
❸-Individual laboratory interviews
❹-Putting questions into a survey instrument
❺-Pre-testing using an approximation of proposed data collection procedures.

6.2.3 Focus Group discussions

The focus group is a special type of group in terms of purpose, size, composition and procedure (Krueger, 1994, p.6). This group involves a small group of people specifically selected to explore the range of beliefs and attitudes in the study population (Fowler,1993). The participants are invited together at a set time and place to discuss a specific issue.

As Fowler (1993) said, "before writing a draft of structured set of questions, it almost always is valuable to conduct focused discussions with people who are in the study population about the issues to be studied. The primary purpose of these discussions is to compare the reality about which respondents will be answering questions with abstract concepts embedded

in the study objectives. The general protocol is to discuss people's perceptions, experiences, and perhaps feelings related to what is to measured in the survey".

6.3.4 Selection of Open or closed questions:

Proponents of the use of open questions argue that they allow respondents to say what is really on their minds without being influenced by suggestions from the researcher, whereas closed questions lock respondents into arbitrarily limited alternatives (Foddy, 1993, p127). Questionnaires with defined response choices have a major disadvantage in that the respondent will be limited by the choice offered.

But answers to open questions are often less complete than answers to corresponding closed questions (Foddy, 1993). If open items are used, respondents may be unwilling to write their answers, for one reason or another (Cohen and Manion, 1985).

The inescapable, overall conclusion that one is forced to reach is that it is dangerous to argue that open questions necessarily produce more valid results than closed questions. On the other side of the coin, it is equally dangerous to argue that closed questions are more efficient - especially if the time taken to develop appropriate sets of response options is taken into account (Foddy, 1993,p150).

Closed questions help the respondents to decide what sort of responses are appropriate, and pre-set response options inevitably act as prompts which help respondents recall information that they might otherwise forget (Foddy, 1993). For closed questions, all respondents answer the question in the same way, the answers can be meaningfully compared, respondents find it easier to answer and analysis is easier (Foddy, 1993).

Schuman and Presser (1979a), contend that closed questions do not suggest invalid answers to questions, as long as the alternatives that are presented to respondents have been properly developed through pilot work, with open questions followed by pre-testing to ensure that the set of response options is appropriate in the sense that all of the required categories, and no inappropriate categories, have been included.

The compromise position as suggested by Lazarsteed (1944), is that open questions should be used at the initial stage of a project, so that the appropriate response categories could be identified for use with closed questions, and also, at later stages in the research, to throw light on apparently deviant answers to the closed questions.

Further, Lazarsteed (1944) argued that the respondents', motivations can be adequately explored with closed questions provided that they are well grounded in the results of pilot

work based on open questions. Beginning with open questions in the pilot work and use the resulting responses as a basis for developing meaningful and exhaustive sets of response alternatives for closed questions is one way to balance the advantages of both approaches.

Methodologists who have considered the issue have tended to settle on the compromise position that a judicious mix of open and closed questions is best (eg. Khan and Cannell, 1957).

6.3.0. Instruments developed for the study.

The list of the instruments is given below. The structure of the instruments is discussed in detail.

1. Interview Scheduled For Teachers (ISFT)**
2. Teachers Questionnaire (TQ)**
3. Student Information sheet (SIS)**
4. Verbal Test of Creative Thinking by Baqer Mehdi (VTCT)**
5. Non-verbal Test of Creative Thinking by Baqer Mehdi (NVTCT)**
6. Teachers Encouragement Scale (TES)**
7. Classroom Observation Scheduled (COS)**
8. Check-list For Head Master (CFHM)**

6.3.1 Interview Scheduled For Teachers (ISFT)

Exploratory interviews might provide the richest qualitative data and the prospect of gaining a deeper understanding of the issues, but analysis of qualitative data from a large sample is time consuming. So initially, semi-structured interviews with a few teachers yielded clues about the kinds of items / responses to be included in the main survey questionnaire. The advantage of a survey questionnaire is that it enables data to be collected from a larger sample. Also, the main purpose of these interviews was to understand teachers' views and the relevance of the questions to the problem. For the interviews a tentative interview schedule was prepared (see Appendix B5). The questions used in the interviews were open-ended, since the researcher's aim was to obtain material to develop a questionnaire as well as to get deeper insights into the teachers' knowledge or answers. The open-ended questions were flexible and allowed the interviewer to probe for more depth of information.

The purpose of the interview was explained briefly in terms the respondent could understand, and in a manner which covered all the types of questions which were going to be asked. If the initial explanation is too narrow or vague, the respondent may not be able to relate

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** These abbreviations are used in this study.

certain questions with the stated purpose (Gorden, 1975, p.265). While explaining the purpose of the research, the interviewer should make assurances that what is said in the interview will be treated confidentially (Bogdan and Biklen, 1992, p.97). The more detailed procedure of the interviews will be explained in Chapter VIII, 8.4.4.

In structured interviews teachers were given freedom to talk about the issues, even if the items were not covered in the schedule. Interviews therefore gave a depth of information regarding regular classroom practices and problems in their implementation. The practical difficulties and feasibility of the development of creativity in schools could be expressed through discussions with teachers. This enabled the development of the questionnaire.

6.3.2 0 Development of Teachers' Questionnaire

6.3.2.1 Designing the Teachers' Questionnaire

As discussed earlier (6.2.3), in the present research a panel of four persons[1] in the field of education and psychology teaching at colleges of education and University College of Education, Osmania University, at Hyderabad[2] were brought together to discuss the development of creativity in school children and to share their ideas, experiences and perceptions. The group members influenced each other by responding to ideas and comments in the discussion. This focus group's discussion facilitated the development of questions for interviews with teachers.

A written draft of open-ended questions, which were carefully selected and phrased in advance to elicit the maximum amount of information, was used as base for discussions. Discussion was facilitated and encouraged, to invite comments of all types – both positive and negative. A non-participant teacher acted as note-taker. Careful and systematic analysis of the discussions provided clues and insights (Krueger, 1994, p.6). Members' comments on drafts of questions, and their other suggestions, were most helpful in designing questions, and ensuring their logical and sequential flow.

6.3.2.3 Drafting the Teachers Questionnaire (TQ)

Before finalising the draft of the TQ, two exploratory interviews were conducted for adding any possible items or deleting irrelevant items in the TQ. The results are presented in chapter VII, 7.5.4.0. Most of the statements used in the interviews were included in the TQ.

The existing literature, focus groups and exploratory interviews gave insight into certain

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[1] Small groups of 4 or 5 participants (compose of homogeneous) afford more opportunity to share ideas and easily accommodated(See Krueger,1994,p.17)

questions and assumptions. A tentative questionnaire was developed from these and circulated among five experts[3] in the Psychology and Education department for their comments. Precautions were taken to minimise the common errors that normally occur. The draft was slightly modified according to the comments and suggestions given by the experts before pilot work.

6.3.3.0 Student Information Sheet (SIS)

This information sheet includes preliminary data about the students, that is, name of the student, name of the school, sex, age, class, mother tongue, religion and caste. Parental education, occupation and income were also included in the SIS. This information was required to explore the parental background of the government school students and enable correlation between students' creativity and parental background.

The students were also asked to name any three school subjects[4] they liked, any three subjects they disliked and three jobs which they would like to do. They were also asked the reasons for their choices. Lastly, two questions were asked to explore their experiences, good and bad, in the classroom (see Appendix-B3).

The responses to these questions enabled exploration of the differences in interests and experiences of high and low creativity scorers.

6.3.4.0 Verbal and Non-verbal Tests of Creative Thinking by Baqer Mehdi

There are very few examples in Indian schools of activities where children are able to demonstrate their creativity. As most of their work involving writing it seemed appropriate to assess creativity using paper & pencil tests.

The Operational Definition of Students' creativity by Baqer Mehdi

Students' creativity is considered to be the creative ability of students represented by their scores on various factors of verbal and non-verbal creativity such as originality, fluency, flexibility and elaboration as measured by Mehdi (1973,1985).

As it is used in this study, the term, "creativity" refers to a fairly specific type of cognitive ability reflected in performance on a series of paper-and-pencil tasks. The instruments were printed in the form of examination-type booklets and were administered to a class of students in exactly the fashion to which they were quite accustomed in connection with taking academic examinations. A premium was put upon writing facility in that, by virtue

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[2] Hyderabad is the capital city of Andhra Pradesh where the fieldwork was carried out. Andhra Pradesh is one of the states in south India.

[3] Two supervisors of the researcher; the research tutor, doctoral center, IOE, Director; Creativity in Education research project, School of Education, The OU, Milton Keynes and a retired secondary school English teacher (migrated from India) who possessed a PhD degree.

[4] There are totally six subjects at secondary level. They are 1. Telugu 2. Hindi 3. English 4. Mathematics 5. Sciences (Physical + Biological) 6. Social studies.

of the group administration of the test, a student's "answers" to the "questions" were to be written down by him / her in the test booklet (eg. Getzels and Jackson, 1962, p.16; Wallach and Kogan, 1965, p. 21).

Beqer Mehdi's Tests (1973, 1975,1985 a &b) of creative thinking, both verbal and non-verbal, were adapted for the present research. There are four verbal tests, viz., Consequences Test, Unusual Uses, New Relationships and Product Improvement, and three non-verbal tests, viz., Picture Construction, Picture Completion, Triangles and Ellipses. The description of the tests and scoring procedures is presented in the following sections. Due to the rapid advancement of knowledge and exposure to modern technology while scoring, if some new responses were obtained by the researcher, they were noted down separately. Originality, fluency, and flexibility dimensions for the verbal test, and originality and elaboration dimensions for the non-verbal test were worked out.

6.3.4.1 The description of the activities in the Verbal Test of Creative Thinking (VTCT)

The verbal test of creativity includes four sub-tests, namely, the Consequences Test (15 minutes), the Unusual (or Novel) Uses test (12 minutes), the New Relationships (or Similarity) test (15 minutes), and the Product improvement test (6 minutes). Thus, the time required for the total test is 48 minutes in addition to the time necessary for giving instructions, passing out test booklets to the subjects and collecting them back (see Appendix B1).

1) Consequences Test: The basis of this activity is Guilford's consequences test or Torrance's "just suppose" activity. The tasks included are based on things familiar to Indian children but are presented in the form of a hypothetical situation e.g. 1. What would happen if man could fly like the birds? 2. What would happen if your school was put on wheels? 3.What would happen if man did not require any food to eat? The tasks confront the students with a situation where there are a large number of possible responses to a hypothetical situation. This implies cause and effect thinking. The number of relevant responses produced by the subject yields a measure of his ideational fluency, the number of shifts in the thinking trends of the consequences gives the measure of verbal flexibility, and the statistical frequency of the response or the departure in thinking from the commonplace gives the measure of originality.

Subjects are instructed to think of as many consequences of the given situation in the test as they can, and write them under each situation in the space provided. The situations are hypothetical and hence minimise the effects of experience. They also provide the subject with

an unlimited opportunity to make responses. This test provides an opportunity for the subject's free play of imagination and originality. Various examples are given in the test booklet to acquaint subjects with the nature of the test. Four minutes are given for each problem.

***2.Unusual Uses*:** The basic idea of these tasks comes from Guildford's Brick Uses test or Torrance's Tin Can Uses test, or Cardboard Boxes Uses test. Common things like water, a wooden stick and a piece of stone are used as stimuli to let the subject's thinking diverge. The activity appears playful to the child but leads him/her to a train of thought, which will yield many novel responses. The number of relevant responses gives the measure of one's ideational fluency, the number of thought categories, gives the measure of verbal flexibility, and the number of uncommon responses gives the measure of originality.

The Unusual Uses test contains the names of three common subjects, such as a piece of stone, a wooden stick, and water-and the testee is asked to write as many novel, interesting and unusual uses of these objects as possible in the test booklet given to pupils. The test is a measure of a subject's ability to retrieve items of information from his/her personal information or ability to think about the problem in a novel and original way. It attempts to measure whether the subject can shift his frame of reference to use the environment in an original manner.

***3.New Relationships**:* Mednick worked extensively with word associations, and his definition of creativity is based upon the remoteness of such associations. In this activity, articles of daily use with which the child is quite familiar are used so as to enable him to think more naturally about the relationships between two apparently dissimilar objects. The items in this activity provide possibilities for scoring responses for fluency, flexibility, and originality in the same fashion as the Unusual Uses test.

The New Relationships test consists of three pairs of words which are apparently different: tree and house, chair and ladder, and air and water. The subject is required to think of and report on all possible relationships between the two objects of each pair of words in the space provided. The test provides an opportunity for the free play of imagination and originality of the testees.

4.Product Improvement: This test of verbal imagination is similar to the one found in Torrance's Product Improvement activity. Torrance used a picture of a toy monkey, but in this test the subject is only asked to imagine a figure of a toy horse and then give responses which would indicate what he would do to make it more interesting and unusual for a child to play

with. The task stimulates the child's imagination and encourages divergent thinking. Apart from ideational fluency, the test also measures flexibility and originality.

6.3.4.2 The scoring procedure for the test

As there are no right or wrong responses for the test, each item is scored for originality, flexibility and fluency. The summary of the scores and procedure for converting raw scores into standard scores (T-scores) are explained in chapter X (see 10.1)

Verbal Originality Scores- Originality is represented by the uncommonness of a given response. Responses given by less than 5% of the group are included and are given different weights. The weights have to be determined on the basis of the following scheme: if a response has been given by 0.1% to 0.99% of respondents, the response will get an originality score is 5; if the response is 1 to 1.99% originality score is 4; if response rate is 2 to 2.99% the originality score is 3; if the response 3 to 3.99% the originality score 2; if response between 4 and 4.99% originality score is 1. Responses given by 5% or more of respondents will get an originality score of zero.

Verbal Flexibility Scores- Flexibility is represented by a person's ability to produce differences in trend of thought. All ideas which differ in approach or trend are treated as one for purposes of flexibility scoring. Thus, if five ideas are produced and all belong to only one category of approach or thought trend, the score for flexibility will be one, but if all of the five ideas are based on five different approaches or thought trends, then the flexibility score will be 5. There could be an intermediate score for flexibility, depending on the number of categories of thought trends to which the responses belong.

Verbal Fluency Scores- In scoring for fluency, the scorer goes through the responses to the item in question carefully and strikes off those which are irrelevant and / or have been repeated. The remaining number of responses is the fluency score.

6.3.5.0 Non-Verbal Test of Creative Thinking (NVTCT)

The non-verbal test of creative thinking is intended to measure the individual's ability to deal with figural content in a creative manner. Three types of activity are used for this purpose, viz., picture construction (10 minutes), picture completion (15 minutes), and triangles and ellipses (10 minutes). The total time required for administering the test is 35 minutes, in addition to the time necessary for giving instructions, passing out booklets and collecting them back (see Appendix B2)

6.3.5.1. The description of the activities in the test

1. Picture Construction Activity- Picture construction has long been used as a measure of a child's creative thinking. Torrance used this test in his battery of creativity tests, but in a slightly different manner. Here the subject is provided with a fixed structure, which he can convert to a meaningful picture, by building on his own imagination. Children vary in their responses to these stimuli, both in terms of elaboration and originality of response. This activity allows for unrestricted fluency of ideas, which may enable the subject to use his unconscious mind to help him to construct a picture which is relevant to his thought and personality structure.

In the picture construction activity, the testee is required to construct two simple geometrical figures, a semi-circle and a rhombus, and to construct an elaborate picture using each figure as an integral part. The subject may turn the page to use the figure in any way he likes for making the picture. Emphasis is put on originality and elaboration. Originality is emphasised by instructing the subject that he should try to make as novel a picture as possible, such that no one else will be able to produce a similar one. Elaboration is emphasised by the instruction that the subject may add as many details as he thinks necessary in order to make the picture tell as complete and as interesting a story as possible.

2.Picture Completion Activity-This activity has also been used by a number of psychologists to study the personality and thought patterns of children. In terms of Gestalt Psychology, "an incomplete figure sets up in an individual tension to complete it in the simplest and easiest way possible. Thus, to produce an original response, the subject has usually to control his tensions and delay gratification of this impulse to closure" (Torrance, 1966). The test can be scored for originality and elaboration.

This activity consists of 10 line drawings which can be made into meaningful pictures of different objects. The subject is asked to make a picture which no one else will be able to think of. He is also asked to give an interesting and suitable title to each picture he makes.

3. Triangles and Ellipses Activity- This activity is based on the idea of Torrance's parallel lines and circles, where repeated figures are given and the subject's novelty is assessed by the construction of different types of figures from the given structure. Generally, non-creative subjects fail to construct new patterns, whereas creative subjects originate new patterns and also elaborate.

In this activity, the subject is provided with 7 triangles and 7 ellipses and required to

construct different meaningful pictures based on two given stimuli. The subject is encouraged to make multiple associations to a single stimulus.

6.3.5.2. The scoring procedure of the test

As there are no right or wrong responses in the test, each item is to be scored for originality and elaboration. Activity III, viz., Triangles and Ellipses, may be scored for flexibility, as the testee is asked to make different pictures from the same given stimulus. However, the test constructor confined scores to elaboration and originality for the non-verbal test, so that the flexibility of the non-verbal score was not used in this study. However, the scoring of titles is optional.

***Non-verbal Originality*:** The same scoring procedure is applicable for originality, as explained in 6.3.4.2.

Non-verbal Elaboration: Elaboration is represented by a person's ability to add pertinent details (more ideas) to the minimum and primary response to the stimulus figure. The minimum and the primary response to the stimulus figure is that response which gives essential meaning to the picture. The response title often indicates exactly what the student is trying to make. Responses, which can be reasonably interpreted and identified, should be scored. Some times the response represents an abstract idea instead of a concrete object. If the figure is not relevant and meaningful, it is ignored. The total elaboration score includes 1 for primary response, plus 1 score each for all the additional details which are given.

6.3.6.0 The Development of Teachers' Encouragement Scale (TES)

This scale was developed by the investigator to measure the degree of encouragement given by the teachers in their classrooms. It is mainly concerned with classroom questioning, teacher behaviour and the freedom given to the students. The literature on teachers' classroom questioning behaviour by *Ellis (1993), Perrott (1982), and Cohen(1976)* and guidelines for promotion of creativity by *Torrance(1962,1962b, 1965), Torrance and Myers(1974), Foster(1971), and Passi (1989)* were used to develop a tool to measure encouragement in quantitative terms. The investigator constructed a rating scale covering the following relevant important areas (Appendix F).

1. Accepting students' feelings in the classroom (Question numbers 2, 22)
2. Classroom questioning (Question numbers 6, 7, 20, 21)
3. Teachers' praise and criticism (Question numbers 8, 9)
4. Teacher-pupil relationships (Question numbers 10, 11, 12, 13, 14)

5. Organisation of classroom activities (Question numbers 4, 5, 17, 18, 19)
6. Encouragement/discouragement of students' interests and other activities. (Question numbers 1, 3, 15, 16)

The wording of items in the scale was made as clear as possible and technical terms were kept to a minimum. The students were asked to rate their teachers in the classroom using the five point scale Always, Usually, Often, Sometimes and Never. If an item given in the scale was positive then the scores were awarded in the order 4,3,2,1 and 0 respectively; if the item in the scale was negative than the reverse procedure was followed. The total score gives an indication of the degree of freedom and encouragement in the classroom. A low score indicates a lack of freedom and encouragement. The scale should be administered in the absence of teachers because this may affect the freedom of the students in marking their responses.

Survey work with school children requires additional care in piloting and fieldwork. For example, interviewing children in a school presents the problem of overcoming the children's possible fear of strangers and getting genuine and valid responses; also there are the logistics of lessons and break-times to cope with. Further, after the third or fourth interview every child in the school will have heard a (probably inaccurate) version of the questions being asked! Group - administered questionnaires can overcome some of these problems, at least with children above the age of nine or ten. *(see Oppenheim, 1992).*

Even then, very great care is required in the pilot stages, and it is best to have several field workers present in each classroom to help with spelling, to answer questions and to distribute and collect questionnaires. Bearing these precautions in mind, and with a promise of confidentiality, excellent results can be obtained quite rapidly from large numbers of school children with the use of pre-coded questionnaires and other closed techniques *(Oppenheim,1992).*

Some of the items in the teacher encouragement scale (TES) were very sensitive. It might prove embarrassing for students to give honest answers. All the students were given pre-coded numbers on the TES, so that they need not write their names. A guarantee of anonymity, can do much to overcome these problems.

6.3.7.0 Classroom Observation Schedule (COS)

A review of the literature indicated no suitable instrument available for the purpose of this study. Most research which focuses on classroom interaction analysis has used the *Flanders Interaction Analysis and Category System (FIACS), Verbal Interaction Category System (VICS), Bale's R. E. Interaction Process Analysis, Reciprocal Category System (RCS), and Equivalent Talk Category System (ETC).* Instruments developed by Perrott (1982), and Rubovits (cited in Cohen,1976) were also reviewed.

The research questions indicated a need to observe the classroom environment, as it may influence pupils' creativity. The classroom environment includes many things, but most important in relation to creativity may be student-teacher relationships, interpersonal relationships among the students, students' attitudes towards school subjects and the method of teaching, students' perceptions about teachers, and the physical characteristics of the class.

For the purpose of this study (see Appendix B7) a frequency recording schedule was developed. With this COS the researcher observed the classes of teachers who were scored high or low by their students on the teacher encouragement scale (TES)(see6.3.6.0).

6.3.8.0 Check-list For Head Teachers (CFHT)

Derived from the literature review, and form discussions with teacher educators in London and India, a checklist was developed of activities supposed to enhance creative thinking among the school children. Headteacher was asked to complete the checklist. Some open questions were also provided in the checklist, to allow further elaboration (see Appendix B8).

6.4.0 Translation of the research instruments

All the research instruments were designed in the English language. As English medium and Telugu (one of the South Indian languages) schools were to be included, these required translation. In India, especially in Andhra Pradesh where the study was undertaken, three languages are spoken from upper primary level. They are Telugu[5], Hindi[6] and English[7]. Because some pupils and teachers teaching and learning in schools where English was not the primary language were felt to be less fluent in English than those from English speaking

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[5] Mother tongue or spoken language of majority people in the state of Andhra Pradesh in south India.
[6] The national language of India, studying as second language at school level.
[7] International language, studying as third language at school level.

schools, it was decided to translate the instruments from English (source language) to Telugu (target language).

6.4.1. The procedure of the translation method followed in the study

The translation process[8] took place in two phases. In phase one, the researcher (translator A) translated all the instruments from the English original version into Telugu. The Telugu version was given to one colleague (translator B), who has knowledge of psychology and education as well as the local language, working as a lecturer in the Dept. of Education, Kakatiya University (India), to translate from the Telugu version into English. The colleague back translated[9] from Telugu into English independently without referring to the original English version.

The researcher conferred with colleagues to clear up errors occurring in translation. In translation, some of the psychological and technical terms were difficult. Telugu Academy[10] textbooks of psychology and education, prepared for Telugu medium students, were consulted as were the Academy Dictionaries of English and Telugu for local usage of words. The flow chart (Fig.1) explains the translation process and how the original source was checked to rectify the errors if any.

In phase two, the researcher (translator A) translated the revised English version into Telugu. The translated Telugu copy was supplied to a lecturer working in the State Council of Educational Research and Training (SCERT) for independent translation. The same procedure was followed as in phase one. The flow chart (fig. 2) explains the translation process of the second phase.

Finally, the recent translated versions were compared and inconsistencies discussed, to establish that the translated version was equivalent in every aspect to the original English version and that the instruments could now be piloted.

After development of the instruments they were piloted. This will be discussed in the succeeding chapter (VII).

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[8] Brislin, Lonner and Thorndike (1973), pp.38

[9] Ibid p. 40

[10] The state government established it for the benefit of local people. It undertakes the job of printing all academic and non-academic books in Telugu language.

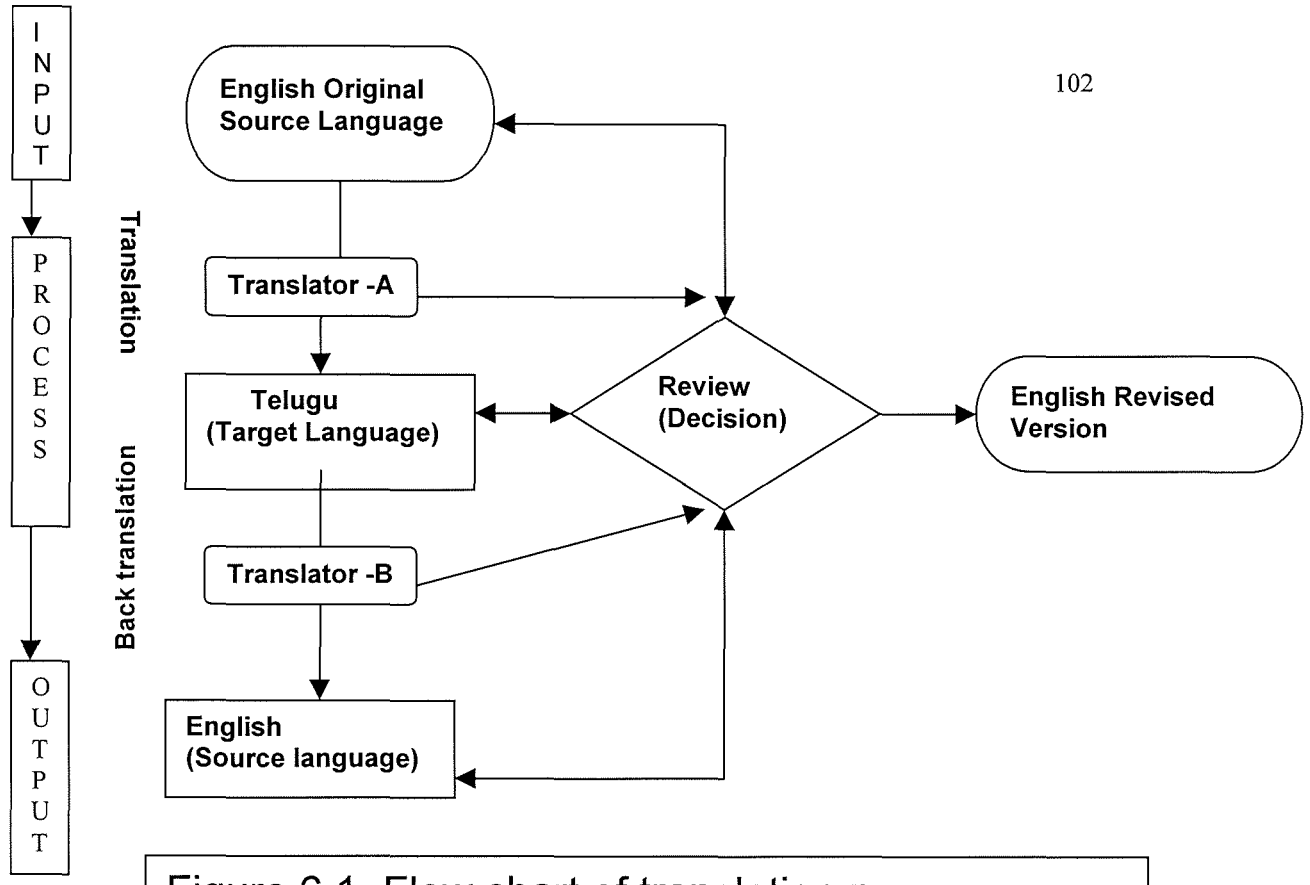

Figure 6.1. Flow chart of translation process-

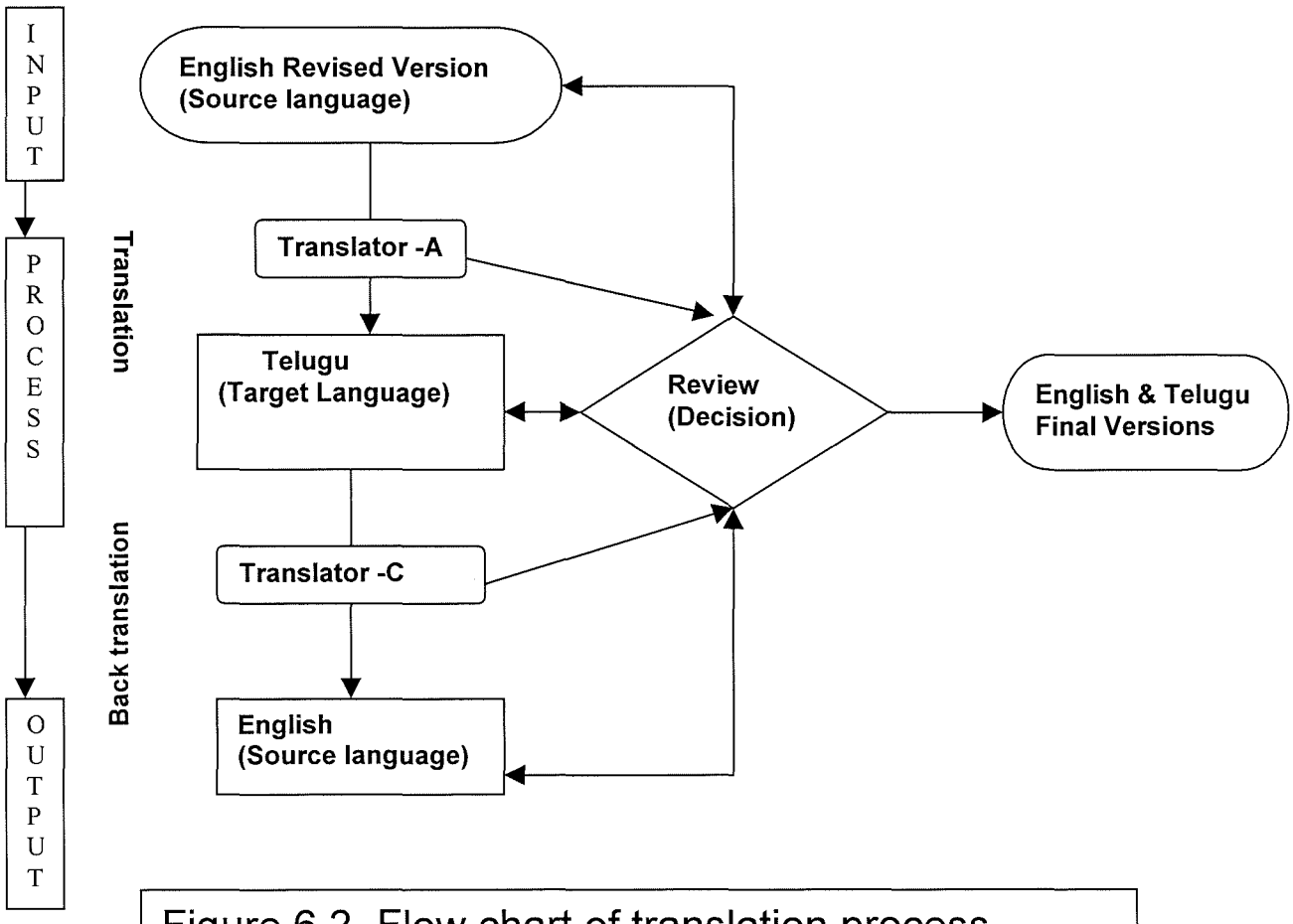

Figure 6.2. Flow chart of translation process-

Chapter VII

Pilot study – Process and Procedure

7.1.0. Introduction

This chapter explains the purpose and procedure of the pilot study, and the administration of the instruments. The item analyses[1] of all the instruments is presented, analysis and the results where they are relevant to the main study.

7.2.0 Purpose of the pilot study

The aim of piloting is to ensure that the instruments to be used are appropriate. It involves asking a small sample to work through the questionnaire/ test in the presence of the researcher and then give feedback to the researcher. The pilot helps in establishing how long the questionnaire takes to answer, difficulties in the wording of questions and any general points. According to the comments, the questionnaire can then be re-drafted (Munn & Drever,1990).

Piloting can help not only with the wording of questions but also with the ordering of question sequences and the reduction of non-response rates. The pre-test is a try-out of the questionnaire to see how it works and whether changes are necessary before the start of the full-scale study. The pre-test provides a means of identifying and solving unforeseen problems in the administration of the questionnaire, such as its phrasing, sequence or length. It may also indicate the need for additional questions or the elimination of others (Kidder, 1981, p.162).

Piloting can also provide a set of multiple choices that will fit the range of answers to be expected and that will reduce, if not eliminate, the loss of information. Whether the questions are put in open or closed form will partly be decided by whether it is possible to provide a set of suitable multiple-choice answers. Pilot work sometimes offers the possibility of choosing quite subtle questions, thus avoiding the expense and possible distortion of coding (Oppenheim, 1992,p.117).

7.3.0. Procedure of the conducted Pilot Study

After the development of the research tools, a pilot study was conducted on a small sample to test the feasibility of the research questions, and research instruments and to explore the trend of the results. Permission was obtained from the relevant authorities to undertake the research. One school was randomly selected for the pilot study.

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1 The item analysis was done by using chi-square(X^2) and Pearson correlation coefficient(r). Creativity test item scores and activity scores were correlated with the grand total from the creativity tests.

7.4.0 Pilot study

Permission was obtained from the headteacher to undertake the study. The pilot study was conducted from 28th November 1996 to 20th December 1996. The school is co-educational from 1st class to 10th class, having two mediums of instructions, English and Telugu. Table 7.1 shows the enrolment of the school by class and sex. The percentage of girls (55.9%) is greater than that of boys (44.1%). The English medium students' percentage (56.7%) is greater than that of the Telugu medium students (43.3%).

Table - 7.1The enrolment in the pilot study School for Year 1996-97.

Classes	Medium of instruction TELUGU		Medium of instruction ENGLISH		Total	
Gender /Class	Boys	Girls	Boys	Girls	Boys	Girls
1-7	116	200	232	229	348	429
8	14	34	13	20	27	54
9	21 (12*)	34 (24*)	35 (22*)	26 (17*)	56 (41*)	60 (34*)
10	14	31	28	25	42	56
Total	165	299	308	300	473 (44.1%)	599 (55.9%)
Grand Total	464 (43.3 %)		608 (56.7%)		1072	

* Participants in the Pilot work.

The study was confined to class 9 only; hence all the students of class 9 from Telugu and English medium were included in the study. There were 116 students but only 80 students were present. Only 75 students' responses were considered for the analysis; 5 students' response sheets were discarded, because they were absent for some of the tests conducted during the pilot work.

All the teachers teaching class 9 were asked to complete the questionnaires. Primary teachers were excluded, because this study is confined to those teaching at secondary level, particularly teaching for standard 9 (see Table-7.2).

Table 7.2: The distribution of teachers working at the pilot study school.

Level of the teachers teaching	Total
1. Primary level	17
2. Secondary level	17*
3. Other teachers	2
Grand Total	36

Table 7.3: The subject-wise distribution of teachers who participated in the pilot study.

Subject	f	%
Telugu	1	5.9
Hindi	1	5.9
English	3	17.6
Mathematics	4	23.5
Bio-Sciences	2	11.8
Physical Science	2	11.8
Social Studies	4	23.5
Total	17	100.0

* Participants in the Pilot work.

The 17 questionnaires were distributed among the teachers with the help of the headteacher (see procedure for data collection in Chapter VIII, 8.6.4.0). All the questionnaires (100%) were completed and returned to the researcher.

The sample included in the study covered all the subjects taught at secondary level. Table-7.3 shows that there were more Mathematics and Social studies teachers than others. The percentage of Telugu and Hindi teachers is much less because the teachers of Telugu and English teach students from both languages.

Table7.4 shows that of 17 schoolteachers in the pilot study sample, 4 (23.5%) were male and 13 (76.5 %) were female. The proportions of male and female schoolteachers working in Hyderabad District[2] at secondary level are 21.3% (2,703) and 78.7% (10,003) respectively, so this sample was rather skewed towards female teachers.

Table-7.4: The distribution of teachers by sex, age, experience, academic and professional qualifications.

Sex	f	Age	f	Experience	f	Academic Qualifications	f	Professional Qualifications	f
Male	4	<30	7	<10yrs	8	AG	13	PG	13
Female	13	>30	10	>10yrs	9	APG	3	PPG	4
						PhD	1		

AG = Academic Graduates (BA/BSc/ B.Com) PG = Professional Graduates (B.Ed /BOL)
APG = Academic Postgraduates (MA/MSc/ M.Com) PPG = Professional Postgraduates (MEd/MOL)

The teachers' age was spread from 20 to 50 years. Seven teachers were under 30 years of age and 10 teachers were above 30 years of age. As for experience, there were more teachers with above 10 years, experience. 13 teachers were graduates and only 4 teachers were postgraduates.

7.5.0.Procedure for the pilot study

7.5.1 Piloting the Student Information Sheet (SIS)

The same procedure was adopted for the pilot study as was explained in chapter VIII (8.6.1). The SIS is very easy to understand and students found it simple to answer the items in it. When informal discussions were conducted with the students, it became apparent that many did not have information about their parents. When the purpose and importance of the study was explained, the students were asked to gather the information regarding their parent's education, income and occupation, to enable them to fill in the SIS easily. The information given by the students was validated with the help of the school authorities. They verified where possible information about parental background. To

2.The Commissioner & Director of School Education, Educational Statistics-1995-96, Government of Andhra radesh, Hyderabad.

understand the parental background of students in the pilot study, the data from SIS were analysed and presented in the form of frequencies and percentages.

7.5.1.1 Item analysis of the SIS

Table7.5 indicates that only 16% of fathers had completed their college education, 56% their school education, whereas only 4% of mothers had studied at college level, 40% at school level and 20% were literate. The illiteracy percentages of fathers and mothers were 14.7% and 36.0% respectively. Generally the parents' education level was very low.

The data in the same table (7.5) reveal that 5.3% of the fathers' had no income,

Table - 7.5: Literacy, economic and occupational status of the parents (frequencies with percentages)

Education	Father	%	Mother	%	Income	Father	%	Mother	%
1. Graduation and above	6	8.0	3	4.0	1. No earnings	4	5.3	59	80.0
2. Intermediate	6	8.0	0	0.0	2. Below Rs.1000	21	28.0	13	17.4
3. School education**	42	56.0	30	40.0	3. Rs.1001 – Rs.3000	35	46.7	1	1.3
4. Literate	10	13.3	15	20.0	4.Rs.3000 and above	15	20.0	1	1.3
5. Illiterates	11	14.7	26	36.0					

Occupational Category +	Father	%	Mother	%
1. Professional and related workers [social worker(1)]	1	1.3	0	0.0
2. Engineering, technical and related workers [Technicians(1)]	1	1.3	0	0.0
3. Administrative, executive and managerial workers	-	-	-	-
4. Clerical and related workers [accountants(2), superintendents(1), clerks(7), typists(1), tele.operators(1), attenders (2)]	14	18.8	0	0.0
5. Sales workers [merchants & shopkeepers (9)] ; [merchants & shopkeepers(1)]	9	12.0	1	1.4
6. Service workers [police(3), cooker(1), Washerman(1)]	5	6.7	0	0.0
7. Farmers, fishermen and related workers [farmer(1)] [Ag. Labour(1)]	1	1.3	1	1.4
8. Production and Transport equipment operators [carpenters(4), drivers(5), rickshaw puller (1) labourers(12), railway workers(7), factory workers (11)] ; [printing(1), Tailors(5), labourers(2) factory workers(3)]	40	53.3	11	14.8
9. Dependents (No job) [(Housewife)]	4	5.3	61	82.4
	75	100	**74?**	100

** Includes primary to secondary
+ National Classification of Occupations (1963,1991), as adopted by the Office of Registrar General and Census Commission for India, Ministry of Home Affairs, Govt. of India, 1991.
____ Underline applicable to mothers only
? One student's mother expired

28% had below Rs.1000, 46.7% had between Rs.1001-Rs.3000, and only 20.0% had above Rs. 3,000 per month. As for the mothers' income, 80% of them were not earning, because they were housewives (see table7.5, house wives 82.4%), 17.4% of them earned below Rs.1000, 1.3% between Rs.1001-Rs.3000, and 1.3% above Rs.3000.

The data in table7.5 shows that the parents of the sample belonged to the lower groups of occupations. Most fathers were production and transport equipment operators (53.3%), clerical (18.8%) and sales workers (12.0%). 6.7% of them were service workers

and 5.3% were unemployed. Very few represent other categories of jobs (only 1.3%). The same table shows that 82.4% of mothers were housewives, 14.8% of them were involved in tailoring, or were labourers or factory workers. Table 7.5 shows that the students studying in government schools have parents whose occupational background is very poor.

The other items in the SIS for example, liking and disliking school subjects, preferring a particular job, good and bad experiences of school and reasons for them were responded to fully. This indicates that all the items were understood except Question No.11 in SIS. The alternatives provided for this Question were not adequate. Students indicated the need for an option to show whether their father / mother had died[3] or whether they were unemployed. An alternative, "No earnings", was added to Question-11.

7.5.2.0 Piloting the creative thinking tests

The verbal and non-verbal tests of creativity, in both English and Telugu booklets, were given to the students (N=75) with the necessary instructions (for more details see Chap.-VIII, 8.4.2). The completed answer booklets were scored and the scores were validated using correlations.

7.5.2.1 Scoring Procedure and Validity of the items

Although the scoring procedure for the test is standardised, and the criterion for working out originality weights is also described in the manuals, it is difficult to have a fully standardised and objective scoring key. Since a major principle of creativity tests is that there are no specified answers, it is impossible to develop a list of highly original responses that have never before been made (Sushma, 1995). Hence, universal weights are not possible for scoring originality. Originality in this study was therefore scored by adopting the procedure that it was first necessary to record the frequency of a particular response in the group as a whole. This frequency was then converted to a percentage of subjects who gave that particular response and weight was assigned on the basis of that percentage. Less common responses were given greater weight as these were considered to be more original (see the scoring procedure in Chapter VI (6.3.4.2 and 6.3.5.2) and Appendix C1 & C2 for originality weights).

7.5.3.0 Piloting the Teachers Encouragement Scale (TES)

The TES was developed specially for this research project. It was designed for the students to rate the extent to which their teachers encouraged creativity in the classroom

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3 While entering the parental background in SIS one girl suddenly started weeping. When the researcher inquired for the reason, she said her mother had died and she asked me where she could mark. It took couple of minutes every body to settle down. That was an unforeseen problem.

(for more details see Chap VIII, 8.4.3). Five subject teachers using the English medium were rated by an average of 8 students (N=39), 7 teachers were rated by an average of 5 students (N=36) from the Telugu medium class 9. The items in the TES were analysed.

7.5.3.1 Item analysis of the TES

The purpose of item analysis in this instance is to make comparisons between respondents' performance on individual items and their score on the instrument as a whole. This technique is used to select from a pool of items those which will most effectively obtain the relevant information, and to eliminate the less efficient items from the instrument. Otherwise the existence of insufficient items reduces reliability by reducing the variance narrowing the gap between high and low scores (Henerson and et al, 1978).

The chi-square (X^2) values for all the items were calculated to test the significance of each item. They are presented in table 7.6. The chi-square test provides a means of comparing experimentally obtained results with those to be expected theoretically from some hypothesis. The difference between observed and expected frequencies is squared and divided by the expected number in each case. The sum of these quotients is, chi-square (X^2) (Garrett, 1981, pp.253-54). The equation for chi-square (X^2) is stated as follows:

$$\mathbf{X^2} = \sum [(f_o - f_e)^2 / f_e]$$

f_o = observed frequency ; f_e = expected frequency

The more closely the observed results approximate to the expected, the smaller the

Table-7.6: Calculation of Chi-square (X^2) values for TES items

Q.No	N	S	O	U	A	Tot	X^2	Q.No	N	S	O	U	A	Tot	X^2
1	2	19	6	14	34	75	41.87$^{\$}$	12	11	29	6	5	24	75	31.60$^{\$}$
2	8	30	9	15	12	74	21.54$^{\$}$	13	7	6	6	7	48	74	93.16$^{\$}$
3	15	23	15	18	3	74	14.65$^{£}$	14	16	12	5	25	16	74	14.24$^{£}$
4	11	25	16	12	8	72	12.03$^{£}$	15	9	7	10	13	35	74	35.73$^{\$}$
5^{X}	11	19	12	10	21	73	6.93$^{\#}$	16	7	16	9	9	31	72	27.17$^{\$}$
6	10	7	4	18	36	75	44.00$^{\$}$	17	7	35	6	9	17	74	39.51$^{\$}$
7	3	9	8	23	29	72	33.83$^{\$}$	18	37	17	3	11	5	73	51.18$^{\$}$
8	8	24	17	9	16	74	11.54$^{@}$	19	9	19	10	12	24	74	11.27$^{\$}$
9	10	4	2	12	47	75	89.87$^{\$}$	20	14	28	8	10	14	74	16.54$^{£}$
10	12	18	8	8	27	73	17.75$^{£}$	21^{X}	20	15	12	20	7	74	8.30$^{\#}$
11	12	15	10	12	26	75	10.93$^{@}$	22	7	33	7	15	12	74	31.14$^{\$}$

N=Never S=Sometimes O=Often U=Usually A=Always

X Items eliminated for main study

$ Significant at 0.001 level ($X^2 \geq 18.46$; Ferguson(1981) p.522.) £ Significant at 0.01($X^2 \geq 13.28$) ;

@ Significant at 0.05 level ($X^2 \geq 9.49$) # Not significant ($X^2 < 9.49$).

chi-square and the closer the agreement between observed data and the hypothesis being tested. Contrariwise, the larger the chi-square the greater the probability of a real divergence of the experimentally observed from the expected results.

The X^2 –values were computed with SPSS[4]. The number of df=(r-1)*(c-1) in which r is the number of rows and c is the number of columns in which the data are tabulated. Here the df=(2-1)*(5-1)=1*4=4. The X^2-values and significance levels are presented in the table-7.6. All the items are statistically significant, except Questions 5 & 21.These two items were dropped from the test for the main study.

7.5.4.0 Explorative Interviews

The purpose of the interviews was to confirm whether the questions included in the interview schedule and teachers' questionnaire were appropriate. The interviews provided the opportunity to include any other key items which might emerge.

The interviewer used, primarily, open-ended questions. The major task was to build upon and explore the participants' responses to the questions (e.g. Seidman, 1991). The goal was to have the participant reconstruct his or her experience within the topic under study and concentrate on the details of the participants' present experience in the topic area of the study.

The qualitative interview explains the life world of the individual and their relation to it. It works with words and not with numbers (Kvale,1996). It has been widely taken for granted that qualitative, in-depth interviews should precede the formulation of fixed-choice questions, so that response categories will reflect the respondents' worlds rather than the researchers' (Coverse, 1984).

For the purpose of this study, two teachers were interviewed independently. A Mathematics (male) and English (female) teacher agreed to be interviewed. They were aged between 40 and 50 years and had experience of teaching for between 15 and 20 years. They were also very enthusiastic about participating in a discussion on creative thinking. The procedure for the interviews was explained in Chapter VIII, 8.4.4.

7.5.4.1.0 Results of the Explorative Interviews

7.5.4.1.1 Creativity – teachers' definitions

The male mathematics teacher's definition of creative thinking was

Creative Thinking is actually self-expression or expression of original ideas or to bring out inner talents that are present in a student.

The English teacher said that creativity means that students may not be good in their ideas but they may be somewhat different. They should think on their own, they should find out alternative suggestions for the given problem. Her definition of creative

4 . Statistical Package for Social Sciences (SPSS)

thinking was:

> Creative Thinking includes original thoughts other than the routine type, new ideas, which may not be the same as previous established thinking. It also includes divergent thinking.

7.5.4.1.2 Creativity - the present education system

Further, she criticised the present system, saying that "I don't find any chance or very little chance being given to students to express their opinions. Usually the system is fully compartmentalised and no scope is given to students for creative thinking.

> We are restricting the brains of students. We do not give them any chance to come out with their original ideas. The answers are dictated and of course, the answers are learnt by heart and they write exams, like this... it goes on. But after completion of their academic learning, when they come out openly for their career prospects or for anything; not only after secondary level but even after the completion of graduation or anything, when they are taking competitive exams or when they are attending interviews, their thinking or their general knowledge or their comprehensive understanding of things around is not as encouraging as it is expected to be.,

The Mathematics teacher also expressed his concern that nowadays creative thinking is rare in schools, because the syllabus is vast and the curriculum does not encourage it. The curriculum should be child – oriented; then it can give scope for students to express their own ideas, their own solutions for the different problems that they come across in their education.

Regarding their knowledge, both the teachers said that they had not been given any special training on creativity but that this topic was included in educational psychology in their training course. They also said that they acquired knowledge about creativity through their own interest by reading journals and newspapers and about the latest trends in education.

The Mathematics teacher said that he also learnt from his own experience in the teaching profession. He suggested that *'teaching is nothing but learning and the teacher is nothing but a learner throughout his life and in this learning process I have learnt a lot in the field of creativity'*.

7.5.4.1.3 Intelligence and creativity- teachers' views

In response to the relationship between Intelligence and creativity the English teacher reported, 'I don't think intelligence and creativity are separate entities. Intelligence does not mean only being bookish; intelligence means adjusting oneself to one's surroundings, and finding solutions to problems, so intelligence includes creative thinking.

If you take out the academic part, there is some kind of creative thinking in every child because the child is very imaginative, so there is a spark of creative thinking in the child. The thing is, it is dormant, and it is not made to come out.

According to the maths teacher, intelligence and creativity are quite different things and an intelligent student may not be creative and a creative student may not be intelligent. Further, he distinguished between the two as follow:

> Creative thinking is something which has nothing to do with previous knowledge. Some new situation is given and from that a creative child may bring out many things, but an intelligent child thinking may be only in one line, maybe what he learns from the teacher or maybe from his parents or he knows something. And he has the solution only in one way, where as a creative boy maybe has many solutions.
>
> - (Mathematics Teacher)

7.5.4.1.4 Creativity- school subjects

When asked about school subjects, the English teacher said that creativity cannot be developed through subjects alone, but has to be encouraged by the teacher.

> In spite of that, where & whenever, if the teacher is interested to develop skill in the students, while teaching in the class, let it be mathematics or let it be science, or let it be language, if the teacher is interested, he/she can develop at least a little bit of interest in her students thinking. -(English Teacher)

The Mathematics teacher said 'teachers should act as guides to bring out talent'. Further, he thought that creative thinking could not be taught, but it can be brought out from the inner talents of the students. The maths teacher also expressed similar ideas. He suggested that developing creativity depends on the attitude of students and teachers.

> I think each and every subject has its own way of developing creativity. Even languages, maybe also have their own way, and of course when it comes to mathematics and sciences especially in science the scope is greater, but it does not mean that languages are not important. We cannot say one subject is less important or more important.
>
> - (Mathematics Teacher)

7.5.4.1.5 Criteria for identifying creative children in the classroom

The teachers were able to identify creative children in the classroom. Their identifying criteria were as follows.

"The way students come out with the problem, the way they come out with the solutions, the way they come out with their answers, the way they respond to the given situations"

- (English Teacher).

"The way of responding, the way of answering, the way of expressing doubts and questions. Not only this, their way of answering examination papers is different, their way of developing solutions or solving problems from other students papers. Last year we had one girl like that. She was doing something that I had taught and doing more than I had taught" - ***(Mathematics Teacher).***

7.5.4.1.6 Importance of creativity in education- teachers opinion

The English teacher said that more importance should be attached to creativity. *"If we encourage the children to come out with their own opinions or solutions they become good citizens of the country and we will have a better society tomorrow".*

The Mathematics teacher also agreed about the importance of creativity. He said,

"education is not to make them pass the examination, education is for the all round development of the whole personality. In that respect what we are doing is, we are not teaching them, we are training them and we are not making or guiding them to bring out their own talents. All students have less or more IQ, they are intelligent; the thing is, we are only creating situations to bring out their intelligence but not the creative thoughts or thinking".

The English teacher explained how she introduces structures. While she is teaching, she uses open-ended questions. e.g. ***if*** you were the Prime Minister or ***if*** you won the lottery. She also uses questions such as why and how? So instead of routine answers or the given answers children can suggest new solutions. They may be afraid of looking stupid, but we should encourage them to express their opinions without fear to speak openly, so that it will help them in the future.

7.5.4.1.7 Obstacles to development of creativity – teachers' views

Regarding the obstacles to the development of creativity, the English teacher said that *"teachers are bound to teach according to the prescribed syllabus and prepare the children for examination, because good performance in examinations is the ultimate aim of students and teachers. Academic excellence is over-emphasised because jobs are linked with degrees, irrespective of creative thinking and intelligence".*

Further, she reported that this is in the child's mind. We suggest to them that "if you want to get a job or anything you should have a certificate". Unless you have this qualification, you can't get a job. We stamp such ideas on them for ages. So a child should be made to realise that there are still openings in society where s/he can develop his skill and at the same time stand on his own.

The mathematics teacher expressed similar views. He also reported that the first and foremost problem was lack of financial support in government schools and a lack of equipment in science and mathematics.

We have to rush through the syllabus (vast) and while rushing, we don't think much. We fail to give thought to creative thinking and this the examination pattern is such, as well as that it does not expect creative thinking. Only a student who mugs up well will get very good marks but a really intelligent or creative students falls back' - (Mathematics teacher)

7.5.5.0 Piloting the Teachers' Questionnaire (TQ)

According to Fowler (1993) every questionnaire should be pre-tested, no matter how skilled the researcher. Virtually every questionnaire could be changed in some way to make it easier for respondents and interviews to meet the researcher's objectives.

A pre-test is also helpful to find out how long it takes to complete a questionnaire. The length of a self-administered questionnaire affects costs, and response rates vary with the population being studied and the topic (Fowler, 1993).

The drafted questionnaire was personally given to all the teachers teaching in standard nine, with the help of the headteacher. The teachers were asked to complete all the items in the questionnaire, and the investigator led a discussion about it. Respondents were asked to identify any confusing and difficult items. The discussion about the meaning of each item was also useful. It helped to identify questions that respondents might have misunderstood or misinterpreted, as well as the format or design problems of the questionnaire. The detailed procedure of administration is explained in chap VIII, 8.4.5.

The teachers responded satisfactorily to all of the items except for one question (No 7). The instruction for question 7 (in Part F, Appendix B6) was rephrased from please tick as many as apply to "Please rank 1 to 5".

7.5.6.0 Piloting the Check-list for Headteacher (CFHT)

The Headteacher of the school was asked to complete the list (See APP-B8) which consists of 26 items and mark the activities organised by the school. The HM marked 12 items (4,6,7,8,10,18,19,20,23,24,25 and 26) which were organised in the school. Most of them were very common activities organised by schools e.g. debates, essay competitions, games, SUPW, NCC, cultural activities, school/classroom decorations. The less common activities in India were: preparation and display of wall posters, visits to historical monuments, museums, excursions, student presentations, assisting pupils in participating in activities which were interesting for them, and school prize days. 14 items (1, 2, 3, 5, 9, 11, 12, 13, 14, 15, 16, 17, 21 and 22) were marked as needing to be organised in the school. None of the items were marked as impractical or not feasible in the school.

The purpose of completing the checklist was to detect and remove any ambiguities, and to ascertain the range of possible responses in the study. The responses showed some ambiguities because some statements were double barrelled. The checklist was re-structured by re-ordering and re-phrasing the statements (See App. B8 & B9). Two more statements were also included in the checklist, information regarding the library (Q.No.17) and laboratory (Q.No.16) facilities.

7.6.0 Summary and conclusion

The pilot study results enabled changes to be made so that all the test items were clearly worded and easy to understand. Correlations between test items, total activity scores, and other factors were calculated. All the correlation coefficients were significant.

The pilot study results reveal that the students attending government schools come from poor parental educational backgrounds; most of the mothers were housewives and unemployed. The parents' occupational background was generally poor.

Chapter-VIII

Research Design and Methodology

8.0.0 Introduction

This chapter deals with the methodology, the framework of the research, the final selection of the sample and procedures for data collection. Finally, the reliability and validity of the instruments will be discussed.

8.1.0 A framework for the present investigation

From the literature review undertaken in chapters II, III, IV and V it seems that students' background variables like sex, age, SES, school type etc, teacher perceptions of pupils, the perceived role and attitudes of the teachers towards creative children, and the role of the school in promoting creativity all play a part in determining measured creativity. These are set out in figure 8.1.

The variables selected for this study have been classified as Organisational Variables (OVs)* Background Variables (BVs)* and Students' Cognitive & Motivational Characteristics (SCMC)*. Creative thinking is the dependent variable. The data analysis procedures are also explained in this framework. Quantitative and qualitative data analysis techniques are used in the study. The variables included as OVs in this study are (1) Type of school (medium) (2) Type of school (gender). BVs include students' sex, age, parental education, occupation, and income; teachers' sex, age, teaching experience, qualifications, and their teaching subjects; and School extra-curricular activities. Students' Cognitive & Motivational Characteristics (SCMC) include students' interests, students' perceptions towards their teachers, teachers' perceptions towards the students, and attitude towards creativity.

8.1.1 Organisational Variables and Creativity

The behaviour of individuals is influenced by the interaction between their personal characteristics and those of the institution. Objective indices like management and type of school will contribute to the general atmosphere prevalent in the school (e.g. Sharma, K; 1991). Forehand and Gilmer (1969) have defined 'behaviour' as a "function of the interaction between personal characteristics and environmental variables". They have considered 'climate' as a set of organisational properties, which may influence the individuals in an organisation. In a study of school climate and creativity , Goyal (1973) found the favourable

effect of school climate on development of creativity.

Study of the school and classroom environment is particularly important because these are a major socialising agency for students. The learning environment in the classroom includes interpersonal relationships among the students, relationships between students and their teachers, students' interests, and achievements.

A review of the research on creativity reveals that there are very few investigations of the various school environmental factors conducive to the development of creativity. Organisational variables such as type of school (gender) and medium of instruction at school level have been taken up in this research to identify their influence on students' creativity.

Schools are classified as Boys', Girls' and Co-educational on the basis of the sex of the pupils' population. Since sex of students has been studied as an independent variable and found to be related significantly to creativity (see 3.5.3), it is likely that the type of school (gender) will also be significantly related to creativity.

According to Sharma, K (1991,p.132) students of co-educational schools were found to be more creative than those of unisex schools, probably because of lesser restrictions imposed by parents on children attending co-educational schools. These children also tend to have fewer conflicts regarding the opposite sex. The literature review revealed that this variable has not been investigated extensively in relation to creativity.

Regarding the medium of instruction, Naidu (1987) concluded in his research that there was a significant difference between the students who were studying in the English medium and the students who were studying in the Telugu medium, in their educational achievement in the subjects of English, Science and Social Studies, in pre and post-teaching situations. Based on the mean values obtained, the students who were studying in the English medium proved to be better achievers in all of the above subjects when compared to the Telugu medium students.

The medium of instruction has been studied relatively little in relation to creativity in the Indian context, although it is an important factor to consider. It is therefore included in this study.

8.1.2 Background Variables - Creativity

The research studies available on sex differences in creativity show diverse findings (see 3.8.3), which makes generalisation impossible and gender therefore an important variable to consider.

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* These abbreviations are used in this study.

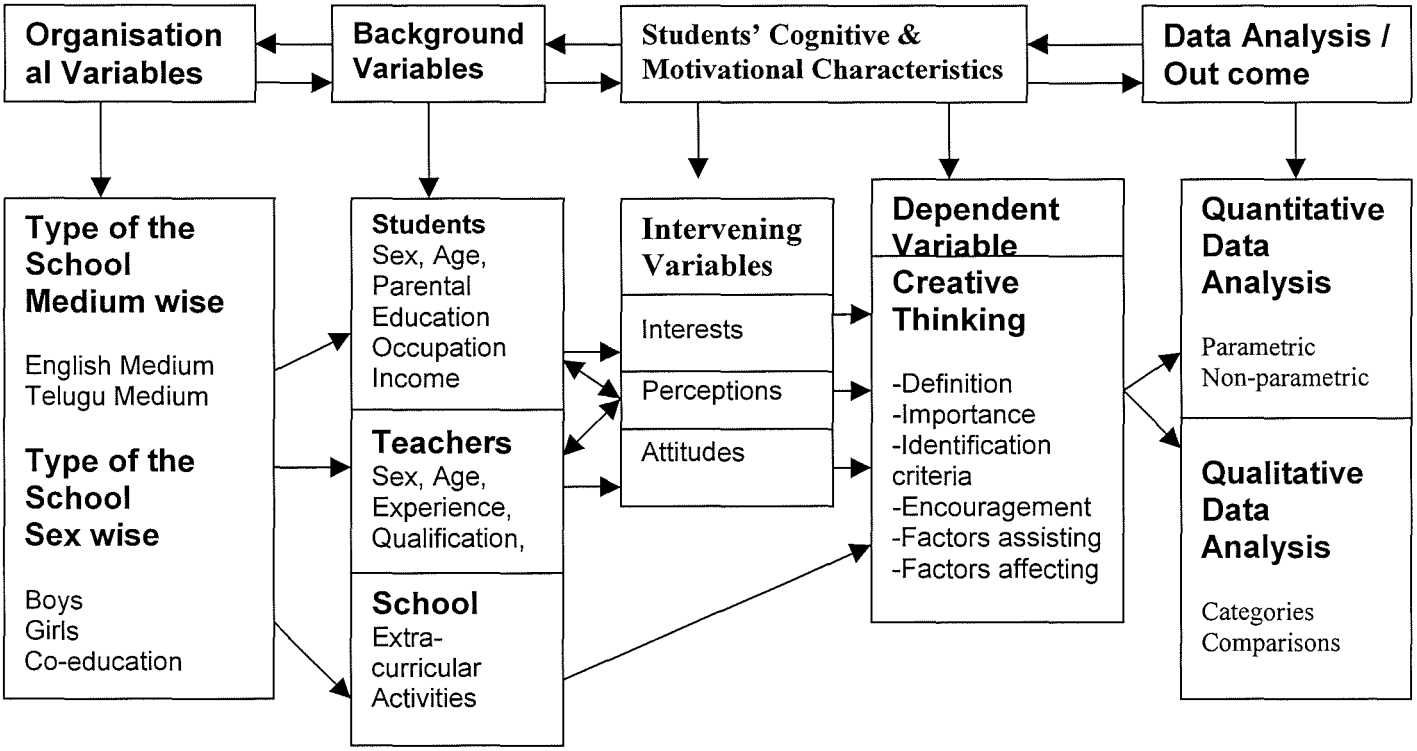

Fig.8.1. The scheme of the present research

Social class differences in creativity have also been explored in a large number of studies, but the evidence has not been unequivocal (Sharma, K., 1991). Taking into consideration the diversity in findings about the relationship between socio-economic status (SES) and creativity (see 3.5.4), it has been decided to explore the relationship between creativity and parental education, occupation and income levels separately.

8.1.3 Students' Cognitive & Motivational Characteristics (SCMC) - Creativity

A number of studies have been reported in the literature regarding the relationship between creativity and cognitive & motivational characteristics such as intelligence, personality dimensions, achievement- motivation, self-concept, academic achievement etc.,. Very few studies have explored the relationships between creativity and other variables like students' interests, teacher encouragement and behaviour in the classroom as perceived by students, and teachers' attitude towards creativity and its development among the students.

The review of the literature shows that most research has been undertaken on the behaviour of the teacher and teachers' perceptions in relation to creativity; hardly any work has been reported on the perceptions of the teachers' behaviour by their students in relation to their gender, medium of instruction, type of school and level of students' creativity. It is also of interest to explore the school subjects, occupational choices, experiences in the classroom and parental backgrounds of children, with high and low measured creativity.

8.1.4 Data analysis

The data was analysed quantitatively and qualitatively. Descriptive statistics and qualitative findings are often presented (Mercurio, 1979) and used together (Fielding and Fielding, 1986). It is common, for example, in designing questionnaires to do open-ended interviews first. But in-depth observations can be used to discover why two variables are statistically related (Bogdan and Biklen, 1992, pp.42).

The researcher used available statistical techniques that are relevant and most commonly used in education and psychological research. Statistical techniques were decided in relation to the type of the data that were collected and also those appropriate to answer the research questions.

If the data were nominal, simple statistics utilising categories and comparisons were explored for example the frequencies, and proportion / percentage of cases in each category (e.g. male or female). Under certain conditions, a Chi-square (X^2) test (non-parametric test) was applied to test hypotheses regarding the distribution of cases among categories

Interval measurement assumes equal distance between the data on a continuous

numerical scale. The interval scale is the first truly quantitative scale. The common parametric statistical tests applicable to data in an interval scale, for example Mean, SD, Critical Ratio (CR), Analysis of Variance (ANOVA), Correlation(r) and Multiple(R) were used. For extraction of factors, Factor Analysis, and to calculate the direct and indirect of the affecting variables Path Analysis, were applied.

The research proposed assumes that creative thinking (dependent variable) of students is a function of the combined effects of background, organisational and cognitive and motivational characteristics.

8.2.0.Research Method

There are different methods of educational research that are very commonly used in the field of Education. The difference in methodology is largely due to the difference in purpose and approach. ***Normative Survey (or Survey)*** is one of the methods suitable for this study.

8.2.1. Normative Survey Research

The method of research which concerns itself with the present phenomena in terms of conditions, practices, beliefs, processes, relationships or trends is variously termed as the 'Normative Survey' or 'Survey'.

The survey approach to educational research is one of the most commonly used approaches. It is adopted in studying local as well as state, national, and international aspects of education. It goes beyond the mere gathering and tabulation of data. It involves interpretation, comparison and generalisation - all directed towards a proper understanding and solution of significant educational problems.

Such research involves describing, recording, analysing, and interpreting conditions or contrasts and attempts to discover relationships between existing non-manipulated variables (Best and Kahn, 1989,p.4). It focuses our attention towards existing educational problems and also suggests ways of meeting them. Survey studies can collect three types of information. (1) What exists? (2) What do we want? (3) How to get there?

8.2.2. Characteristics of Normative Survey Research

1. Normative survey research is concerned not only with the characteristics of individuals but also those of the whole population or a sample thereof. 2. It collects data from a relatively large number of subjects. 3.It provides information useful to the solution of local problems. 4.Its scope is vast. 5. A survey may be qualitative or quantitative. 6.Descriptions may be either verbal or expressed in mathematical terms.

8.3.0 Sampling procedure for the main study

The sample for the main study was selected in two stages. In the first stage, the selection of schools was made. In stage two, students and teachers were chosen from the selected schools. Nine schools were selected in total from the current list of Government schools in Hyderabad, Andhra Pradesh (India).

Hyderabad is a large city and the capital of Andhra Pradesh (AP), a state in India, being 217 sq.kms in area and 31 lakhs in population (see Appendix-A3, TableA3-T1). There are a total of 7,896 high schools in the state of AP (71, 055 in India); among them 887 schools are government schools (Appendix A3 Table A3-T3 & T5). In Hyderabad, 452 high schools work under various managements, among them 98 are government high schools (Appendix A3, Table-A3-T7). The government of AP divided all these schools into seven zones for administrative convenience. These schools are widely scattered throughout the city. It would be quite impractical randomly to select students and spend an inordinate amount of time travelling about in order to test them. By cluster sampling, we can randomly select a specific number of schools and test all the children in those selected schools (Cohen and Manion, 1994, p.88).

In three zones out of seven, the government high schools attached to Junior Colleges, in the Secundrabad and Sanathnagar Zones were purposively selected for this study. The factors considered in selecting these schools were the living conditions and similar social background of the sample to be selected, administrative and travelling convenience, minimising the cost and time and achieving an adequate sample. These zones also have many schools clustered together, and the sample contains subjects with characteristics similar to the population as a whole.

Initially all the 98 Government schools were divided into subgroups or strata on the basis of medium of instruction and type of the school (Appendix-A3, Table-A3-T7). From the above three zones, by using a disproportionate stratified sampling technique (due to the non-availability of schools in some strata and the great variation in the strata) it was possible to get more of the sample from one stratum than an other and to achieve an adequate sample to compare the students' creativity in relation to their sex, medium of instruction and gender type of the school. Initially an attempt was made to select co-educational schools, followed by unisex schools, using simple random techniques within the stratum to reach the target sample size (above 300). Nine schools were eventually chosen, of which three used English as a medium, four Telugu and two both Telugu and English media (Appendix A3, table-A3-T8).

In the Secondary Schools there are stages comprising classes from VIII to X; the age of the students is between 14 and 16 (See Appendix A1). Among these three classes, IX class was chosen because VIII class students have just entered from Upper Primary to Secondary and they have therefore been little exposed to the teaching and environment of the school. The X class students were not selected, as they have to take a public examination. The students of X class and the teachers teaching them are preoccupied with preparation for examinations and completion of the syllabus. The students of IX class get an automatic promotion[1] to the next class so there is less pressure on them than on VIII and X class students.

For these reasons the present sample was selected from the ninth standard. The students of class IX studying in government schools in Hyderabad were considered as the population. The students' sample was drawn from nine schools as explained above. All the IX class students were included from each school where there was only one section (or class). In the case of more classes (IXA, IXB, IXC.....) in the school, the random number selection procedure was followed (Best and Kahn ,1989, pp.12-13 and Fox , 1969, pp.234-35). For this, the available list of all students from all sections studying in that school was assembled (Fox, 1969)[2], and a number assigned for each student from 1 to the end of the list. The list simply served as the basis for assigning a number to each member of the population. By using the table of random numbers, on average about 40 students were selected from a school.

All the Head teachers and the teachers teaching class IX students were selected for this study, which was carried out between January 1997 and the end of April 1997.

8.3.1 Students' Biographies

From the above process, a total of 373 students were selected with 33% of them coming from English medium schools, 44% of them coming from Telugu medium schools and 23% of them coming from English and Telugu medium schools. The frequency distribution of the Medium of instruction by type of school is shown in table 8.1 and figure 8.2. The same table reveals that 15.8% are from boys' schools, 32.7% coming from girls' schools, and 23.6% boys and 27.6% girls from co-educational schools. Altogether the

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[1] In Andhra Pradesh, the non-detention system of education is implemented for transfer from primary to secondary (except VII and X classes). In this system every student gets promotion if he fulfils requirements of attendance and a minimum percent of marks in monthly and annual examinations.

[2] Fox(1969) says, " It makes no difference how the list was made up. It could be alphabetical, it could be in order of ascending size, or it could be a list made up as we recalled the names of the schools".

percentage of girls (60.6) exceeds the percentage of boys (39.4).

Table-8.1: Frequency distribution of sample by medium of instruction and type of school (sex wise)

Medium of instruction	Type of the School				Total	%
	Boys	Girls	Co-education			
			Boys	Girls		
1. English	47	76	-	-	123	(33.0%)
2. Telugu	-	-	60	104	164	(44.0%)
3.English and Telugu	-	25(EM) 10(TM)	28(TM) 12(EM)	11(EM)	86	(23.0%)
Total	47 (12.6%)	111 (29.8%)	100 (26.8%)	115 (30.8%)	373	(100.0%)

EM= English Medium; TM= Telugu Medium
Note: numbers within brackets ( ) indicates percentages.

Table 8.2 and figure 8.3 shows that the students' age varied from 12 to 17 years and the average age was 14 years. 87.1% of the girls were between 12-14 years and only 12.9% between 15-17 years, whereas the percentages of boys between 12-14 years and 15-17 years were 54.4% and 45.6% respectively. The findings indicate that either girls started school earlier than the boys or they were more successful in examinations without any repetition of classes.

Table-8.2: Frequency distribution of sample by gender and age

Sex/Years	12 Yrs	13 Yrs	14 Yrs	15 Yrs	16 Yrs	17 Yrs	Total
1.Girls Row %	**9** (4.0)	**60** (26.5)	**128** (56.6)	**25** (11.1)	**2** (0.9)	**2** (0.9)	**226** (100)
Column %	(100)	(72.3)	(69.2)	(34.2)	(10.5)	(50.0)	(60.6)
2.Boys Row %	**0** (0.0)	**23** (15.6)	**57** (38.8)	**48** (32.7)	**17** (11.5)	**2** (1.4)	**147** (100)
Column %	(0.0)	(27.7)	(30.8)	(65.8)	(89.5)	(50.0)	(39.4)
Total (%)	**9** (100)	**83** (100)	**185** (100)	**73** (100)	**19** (100)	**4** (100)	**373** (100)

8.3.2 Teachers' Biographies

(A) Questionnaire:

It was intended to collect basic background information about the teachers' sample to enable analysis of the teachers' views in relation to their background variables. This was covered in part A 'Teacher's Biography' of the Teachers Questionnaire. The following tables present the demographic variables Sex, Age, Experience, Academic and Professional qualifications, and taught subjects. The figures also show the major differences between sub samples (See fig.8.4 and 8.5).

Figure-8.2: Distribution of sample by Medium of Instruction and Type of School

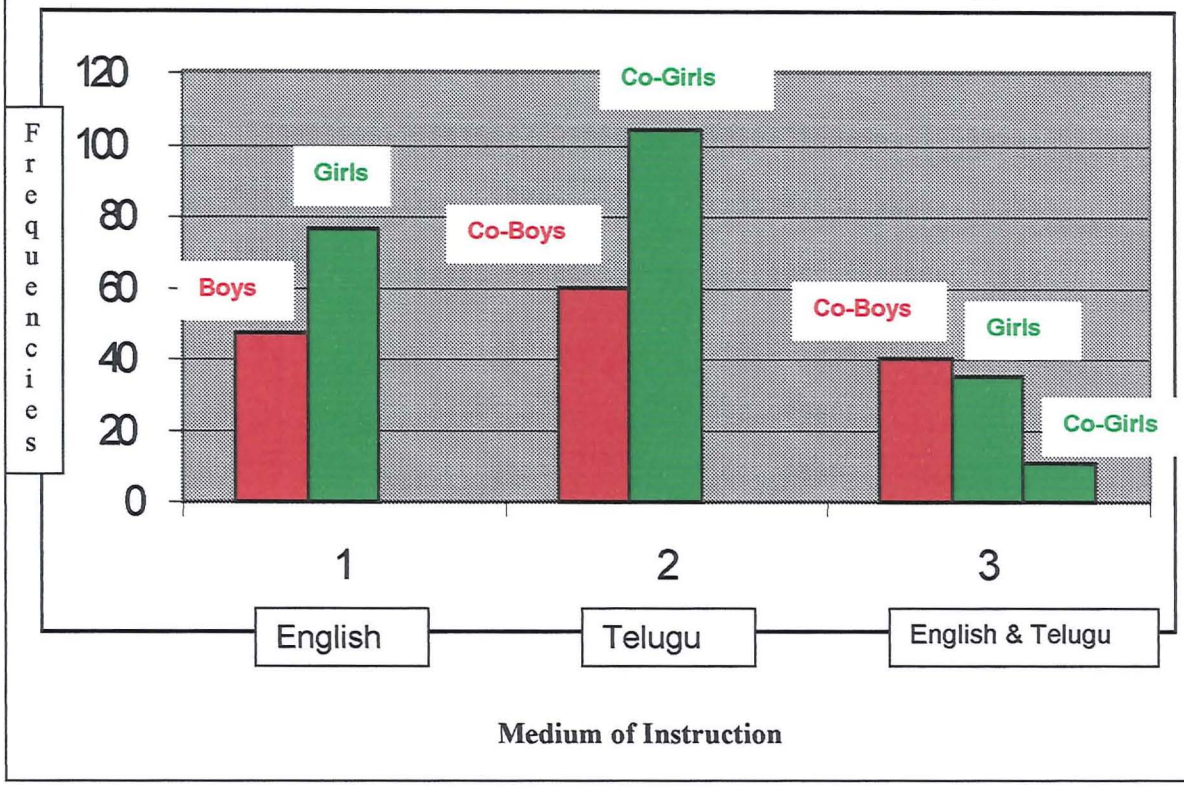


Fig.-8.3 : Distribution of the sample by gender and age

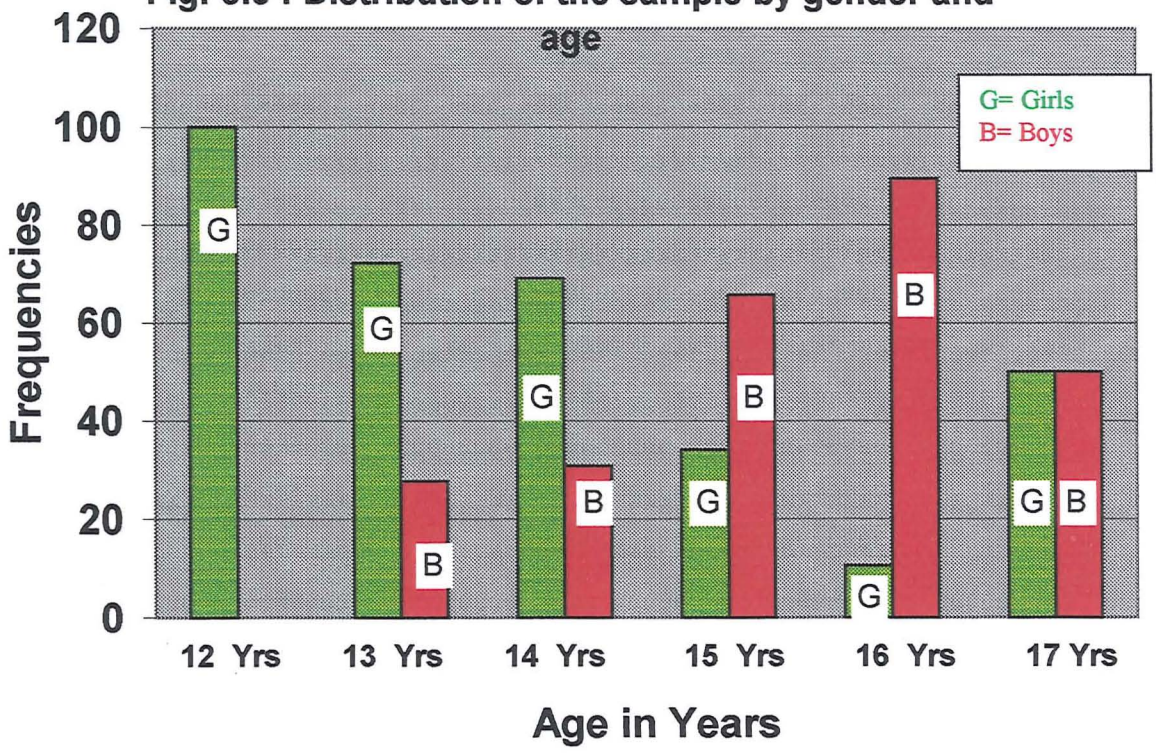


Figure8.4: Frequency distribution of the teachers by Sex, Age and Experience

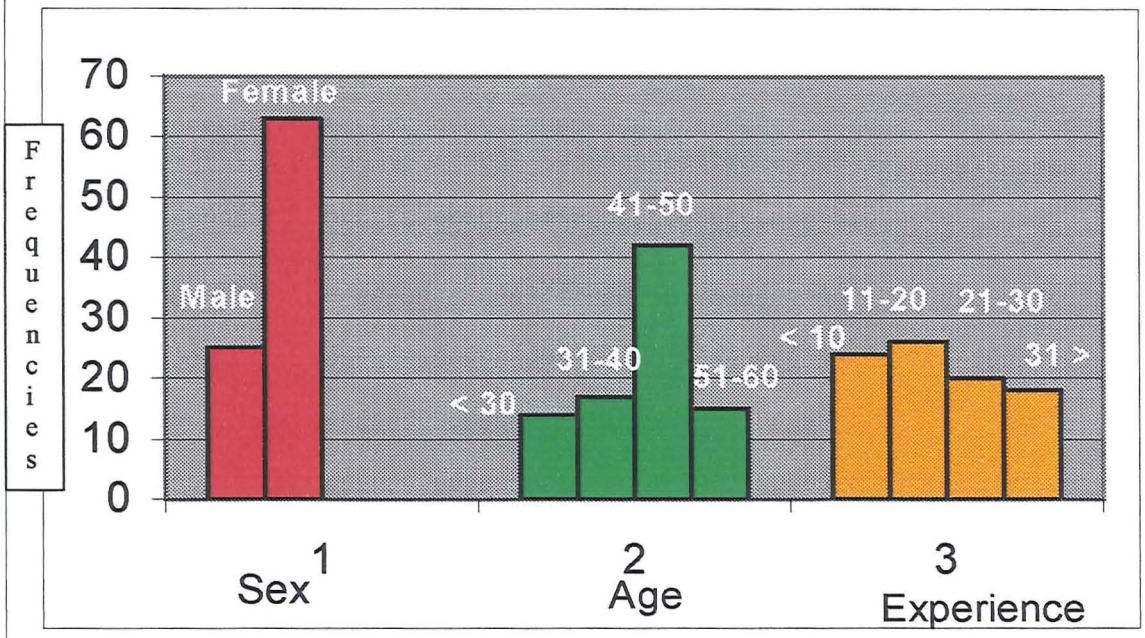
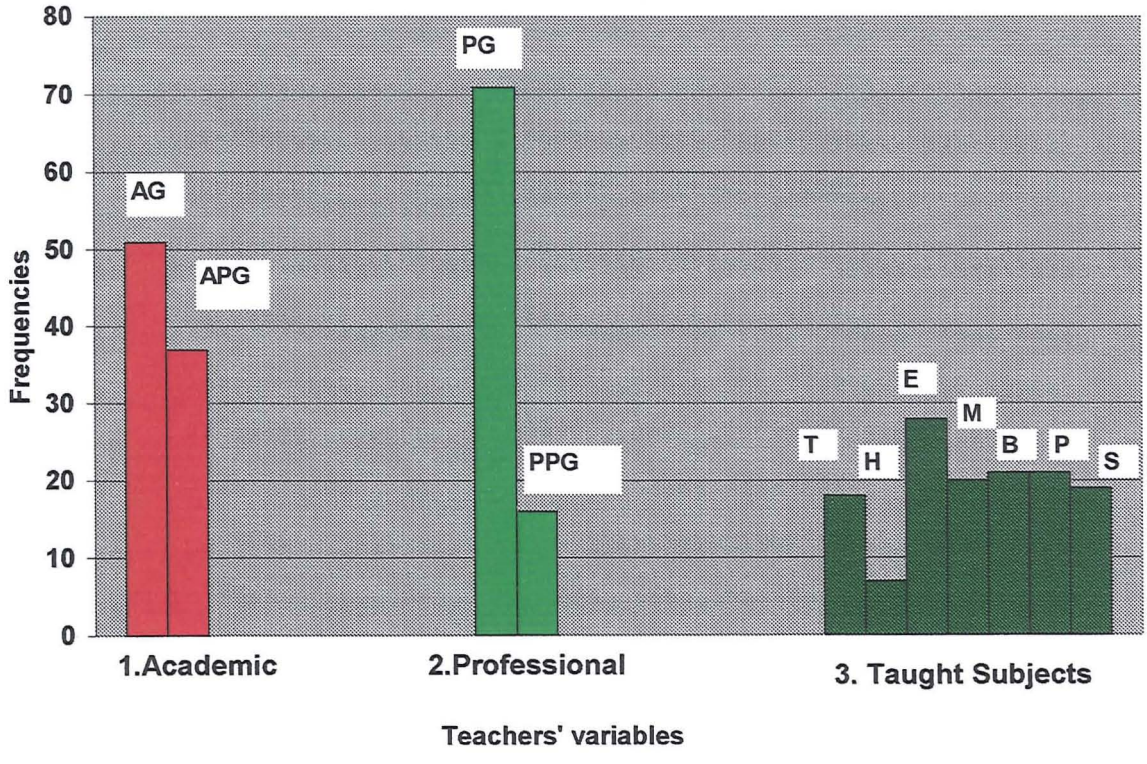


Fig.-8.5: Frequency distribution of the teachers by qualification and taught subjects



AG= Academic Graduates APG= Academic Postgraduates PG = Professional Graduates
PPG= Professional Postgraduates T= Telugu H= Hindi E= English M= Mathematics
B= Biological sciences P= Physical Sciences S= Social Studies

It can be seen from table 8.3 that out of 88 teachers in the main study, 25 (28.4%) were male and 63 (71.6%) were female. The sample was skewed towards female teachers, but if we look at the population of the teachers working in Hyderabad[3] it is clear that there was not any sample selection bias, since the proportions of male and female school teachers working at secondary level are 21.3% and 78.7% respectively.

Age is spread between 20 and 60 years; the majority of the teachers belonged to the age group 41-50 years (47.7%). About 20% of the teachers were between 31-40 years of age, whereas the other age groups the below 30 Years and between 51-60 years groups, were 15.9% and 17.1%, respectively. As for years of experience, the majority of teachers (56.8%) had teaching experience of less than 20 years, and 43.2% of them had more than 20 years of experience.

From the same table 8.3, it is clear that almost all the teachers were academically and professionally qualified. The majority of the teachers (58%) held Bachelor degrees (B.A/B.Sc./B.Com) and 42% were Postgraduates (M.A/M.Sc./ M.Com). For their professional training, most of them (81.6%) had Bachelor degrees (BEd/BOL[4]) and only 18.4% were postgraduates (MEd/MOL[5]). It is also evident from the same table that the sample is composed of teachers representing, all the subjects taught at secondary level. An equal number of teachers are (20.5% – 31.8%) included from all subjects in the study, except Hindi (only 8%).

Table-8.3: The overall composition of the sample characteristics-sex, age, experience, qualifications and taught subjects

Sex	**f (%)**	**Age**	**f (%)**	**Experience**	**f (%)**
1. Male	25 (28.4)	< 30 Yrs	14 (15.9)	< 10 Yrs	24 (27.3)
2. Female	63 (71.6)	31- 40 Yrs	17 (19.3)	11 - 20 Yrs	26 (29.5)
		41- 50 Yrs	42 (47.7)	21 - 30 Yrs	20 (22.7)
		51- 60 Yrs	15 (17.1)	> 30 Yrs	18 (20.5)
Academic Qualifications	**(f) (%)**	**Professional Qualifications**	**(f) (%)**	**Taught Subjects**	**f (%)**
				1.Telugu (T)	18 (20.5)
Graduates	51 (58.0)	Graduates	72 (81.8)	2.Hindi (H)	7 (8.0)
Postgraduates	37 (42.0)	Postgraduates	16 (18.2)	3.English (E)	28 (31.8)
				4.Mathematics (M)	20 (22.7)
				5.Bio-Sciences(B)	21 (23.9)
				6.Physical sciences(P)	21 (23.9)
				7.Social Studies(S)	19 (21.6)
					134*

* 46 Teachers teaching more than one subject (Multiple responses)

[3] See Appendix-A3, Ttable-A3-T4. It shows that out of 12,706 teachers, 10,003 (78.7%) were female and only 2,703(21.3%) were male.

[4] Bachelor of Oriental Languages which is an essential qualification for language teachers of Telugu

(B) Interviews:

All the teachers (N=88) completing the main survey questionnaire were given an opportunity to elaborate on their responses by volunteering to take part in an individual interview to be conducted at a later date (e.g. Fryer, 1989,p.114). Ten teachers out of eighty-eight agreed to take part in the interviews. The characteristics of the interviewees are presented in Table 8.4. The interviewees were not selected according to these characteristics but it is important to be aware of information about the teacher's age, experience and qualifications.

To maintain confidentiality the researcher used labelled names instead of teachers' original names (Table-8.4). As far as age is concerned, out of 10 teachers 3 were under 30 years of age, 4 were between 31-40 years and the remaining 3 were above 40 years old. Regarding experience in teaching, 5 had less than 10 years, 3 had between 11-15 years and two teachers had 15 years. The data reveals that all the teachers were qualified[6] and some highly qualified (Postgraduates).

Table-8.4: The overall composition of the interview sample characteristics- sex, age, experience, qualifications and teachers' labelling.

Subject Teachers	Sex	Labelled*	Subject Teachers	Sex	Labelled*
1. Telugu	F	T FT1	6. Phy. Scie.+ Maths	M	PS+M MT6
2. English	M	E MT2	7. Physical Sciences	M	PS MT7
3. English+Bio-Sc	M	E+BS MT3	8. Bio-Sciences	F	BS FT8
4. Mathematics	M	M MT4	9. Social studies	M	SS MT9
5.Mathematics	F	M FT5	10. Social studies	F	SS FT10

Age	f	Experience	f	Academic Qualifications	(f)	Professional Qualifications	f
< 30 Yrs	3	< 10 Yrs	5	Graduates	4	Graduates	7
31 – 40 Yrs	4	11 – 15 Yrs	3	Postgraduates	6	Postgraduates	3
> 40 Yrs	3	> 15 Yrs	2				

* Please note these labelled abbreviations may be used in the future references.

8.4.0. Procedure for data collection

The researcher visited the schools for the purpose of collecting data. Rapport was established with the headteacher, teachers and students by giving a self-introduction and by explaining the purpose and objectives of the study. The subjects in the study were assured of the maintenance of confidentiality of their responses. To maintain anonymity the students and teachers were not asked to provide their names on the questionnaires.

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[5] Master of Oriental Languages which is a additional qualification for language teachers of Telugu

[6] A Bachelor degree (BA/BSC/Bcom) and teacher training (B.Ed) are minimum qualifications.

8.4.1 Student Information Sheet (SIS)

The SIS was distributed among the students of class IX. The students were asked to fill in the columns for name, school name, parental background, etc., The other questions asked in SIS were explained. After the general instructions had been given, the researcher confirmed that the children understood. The students were allowed to ask any questions regarding the SIS during the session. The researcher was present throughout to answer questions.

The SIS was administered in the morning session, with English medium students in the first hour and with Telugu medium students in the next hour. These precautions were adhered to strictly, to avoid consultation between students of both media until they had completed the activities. Forty minutes' time was given for the students to complete the SIS. The two versions of the instruments i.e., English and Telugu, were used during the pilot / main study for the different media students. They are also asked to write their responses either in English or in their mother tongue, Telugu. The headteacher, class teachers and students co-operated during the entire study.

8.4.2 Creative thinking tests

The standardised creative thinking tests (both verbal and non-verbal) and the translated Telugu version both verbal and non-verbal were administered to IX standard students in normal classroom conditions with good light and ventilation with the help of the headteacher and class teacher. Students being tested were seated sufficiently far apart to prevent copying. The researcher explained briefly why the tests were being administered and emphasised the personal value of the tests for all the students, so that they would be motivated to complete them.

Special instructions were given to the group. Students were asked to read the directions given in the booklet, and the researcher read them again aloud. Each student was given one Verbal Creative Thinking Test booklet. The test booklets provided a place for the responses to each activity. The booklets were scored according to the procedure explained in the previous chapter (6.3.4.2 & 6.3.5.2). The non-verbal test of creative thinking was conducted on the next working day. The whole pilot / main study work was carried out in the morning sessions only, to avoid boredom and to hold the interest of the students.

8.4.3. Teachers' Encouragement Scale (TES)

This scale was administered in the normal classroom with the same students as mentioned earlier. The students of English were asked to rate all their subject teachers. The same procedure was adopted with Telugu medium students. The students were discouraged

from writing their name on the TES. The TE scale was pre-coded with the list of students. The code numbers were randomly given. Later the corresponding names were decoded by the researcher. This was done to maintain confidentiality. While administering the instrument the researcher was present in the classroom to clarify any doubts about filling in the scale. No teachers were present, as the presence of teachers might have greatly affected the responses made. A discussion with some students about the difficulty of questions and their meaning was helpful in modifying the instrument in the pilot study.

8.4.4. Interviewing procedure, recording and transcribing.

The researcher negotiated with teachers a time and place for the interviews. Most of the interviews were conducted in the school during school hours when the teachers were free from teaching, either in the staff-room or in other rooms where there was availability of electricity[7] and the environment was suitable for interviews i.e., light, ventilation, proper seating arrangement, no external disturbances. The interviews took one to two hours, including preparation and follow-up. The teachers felt comfortable and expressed their views without any anxiety. They were confident that their suggestions would be taken seriously and hoped that the necessary arrangements would be made as soon as possible by the government. They were unhappy with the present conditions prevailing in government schools and hoped that the study would help them to present their views representing the education world and open the government's eyes.

After the pilot study, the researcher decided not to take copious notes while interviewing the teachers. Some notes were taken to stress that their views were considered to be very important and to be usable if the tape recorder stopped working. Tape recorders cannot be completely trusted (Krueger, 1994, p.111).

As Gorden (1975) said,

"Intense note taking may distract the interviewer from his task of observing and listening to the respondent. Also, the respondent may feel the interviewer should not neglect him and should show more spontaneous appreciation. When a few notes are taken, the respondent may feel that, when interviewer is writing, something important has been said (p.272).

Further he says *the tape recorder is an excellent tool on the initial exploratory interviewing and subsequent pre-testing of the interview schedule" (p.273).*

The researcher recorded the interviews with the consent of the teachers. They were told the advantages of recording interviews on tapes, how note-taking distracted attention and how the respondent found it difficult to listen while note-taking. Steps were taken to

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7 Some schools do not have electricity in the classes and some schools have been disconnected (ex G.H.S Lalapet) due to the non-payment of bills. The researcher used batteries while recording.

ensure confidentiality and the kinds of assurances were given that are appropriate to give to respondents. As *Oppenheim (1992)* writes, *'adequate trust and rapport between interviewer and respondent is probably the single most important method of reducing bias'*. 'The relationship between researcher and teachers was friendly but not a friendship (Oakley, 1981).

The researcher used a large battery-operated tape recorder with a separate microphone. Some school did not have proper electricity connections in all rooms. Some recorders with built-in-microphones can also muffle the sound and make transcribing difficult (Seidman, 1991). Built in microphones on cassette recorders tend to have limited sensitivity (Krueger, 1994, p.12) and the small batteries' life is less so the interview recording may be interrupted, creating tension for the interviewer about the recording.

The researcher has translated verbatim the spoken words into a written text to study. Each word a participant speaks reflected his or her consciousness (Vygotsky, 1987). The other benefit of tape-recording is to preserve the words of the participant. If something is not clear in a transcript, the researcher can return to the source and check for accuracy (Seidman, 1991). The participants can feel assured that there is a record of what they have said, and have more confidence that their words will be treated responsibly. The researcher who did the interviews did the transcribing. Through this process the interviewer becomes aware of the amount of missing information and is strongly motivated to probe more persistently in subsequent interviews (Gorden, 1975, p.276).

8.4.5 Teachers' Questionnaire (TQ)

The TQ is not very long, but considerable time is required to go through it and to write responses for the open-ended questions. The teachers were given the questionnaires to work on at their leisure (Gorden, 1975, p.307). Sufficient time of one to two weeks was given to the teachers to complete the TQ as they were busy with their regular classroom teaching and they had to finish their syllabus by the second/third week of March'97. The students of X class have to attend public examinations i.e., S.S.C[8] in March. All the teachers included in the study were teaching X standard as well as standard IX. The teachers were told individually how to fill in the questionnaire, as all the teachers were not available at one time. While filling in their TQ, they were requested neither to consult other teachers nor to see their completed TQ. They were asked to fill the TQ in independently. The reasons for

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[8] Secondary School Certificate (SSC) is the public examination, which terminates school education and carries the minimum qualification for entering in to the college education.

this were explained. They were given liberty to ask any questions, where they did not understand. The TQs were provided in two languages, i.e., English and Telugu. They could choose any language according to their proficiency and could write in either of the languages.

8.4.6 The classroom observation scheduled (COS)

The researcher observed some of the classrooms, to assess the teaching behaviour of the teachers using the classroom observation schedule (COS). The researcher observed twelve teachers' classes, those scoring high (6) and low (6) mean scores on the Teacher Encouragement Scale (TES) as assessed by their students. The teachers were teaching four different school subjects at secondary level. The researcher was not an expert on all of these subjects. For this reason, it was difficult to judge each teacher and every aspect of the lesson at a single attempt. The researcher also recorded the lesson on audio-tapes. The microphone recorded the teacher talk, not the students' talk.

It became apparent that it would be difficult to analyse classroom behaviour without the students' and teachers' interaction. Context and facial expressions are also missing on the tapes. It was not possible without video to play back to recheck or re-code the data. It was also difficult to establish inter-rater reliability of the observation without videotapes. The researcher because aware that video recording would be the way to overcome this difficulty. However video recording can change the entire environment and affect the participants' spontaneity. It also requires several cameras with operators to swing cameras quickly to follow the flow of conversation and is therefore very expensive. For these reasons it was not used.

Classroom observation is complex and for observing different teachers' behaviour a team of experts in each school subject may be needed to judge properly. Due to these problems the data analysis of the classroom observation was dropped from the research. It was not in any case the main area of the present research. It was only planned in order to cross check the Teacher Encouragement Scale (TES) data.

8.4.7 The Check-List for Headteacher (CFHT)

The 26 items check list was supplied to all the headteachers of the nine schools. They took one week to two weeks to complete it, due to their administrative and supervision responsibilities. The directions for completion were explained to them and afterwards the researcher clarified doubts. If the response was ambiguous, the researcher rectified immediately.

8.5.0 Reliability and validity of the instruments.

Ross and Stanley (1955) comment that the ideal test tells the truth consistently. Truthfulness is related to test validity. The two concepts, reliability and validity, are closely interrelated as the two reflect the test's efficiency. A test may be reliable without being valid but it is not quantitatively valid unless it is also reliable *(Greene, Jorgenso and Gerberich, 1948)*. A highly valid test is also highly reliable because its correlation with a criterion is limited by its own index of reliability. Thus reliability puts an upper limit to the validity of a test *(Remmers and Gage 1955)*.

Reliability: Reliability is the degree to which a test consistently measures whatever it measures. The more reliable a test is, the more confidence we can have that the scores obtained from the administration of the test are essentially the same scores that would be obtained if the test were re-administered (Gay, 1990). Reliability is therefore consistency in securing accurate scores and consistency implies repeatability or reproducibility (Heim, 1954). Indeed, the more consistent the test scores are the higher is the reliability coefficient of the test.

Test reliability is often expressed in terms of a reliability coefficient. A reliability coefficient refers to the extent to which a test is internally consistent (ie., the accuracy of measurement) and it refers also the extent to which a test yields consistent results on testing and re-testing *(Heim,1954)*.

The various measures of reliability coefficients are (i) test-retest method (ii) split-half (iii) parallel or alternate forms and (iv) rational equivalence (Kuder-Richardson method).

Validity: The validity of the instruments or techniques used in gathering the data is crucial to the validity of the conclusions that are derived from surveys. To the extent that the instruments used are not valid- and one must remember that validity applies to a particular situation under specific conditions- the results obtained cannot be interpreted nor can generalisations be reached (Mouly, 1964, p.235). As Garrett (1981, p.354) said, 'Validity is a relative term. A test is valid for a particular purpose or in a particular situation-it is not generally valid'.

We know that every test is constructed with a purpose viz., to provide a measure of a defined variable. We may define validity as the degree to which this purpose is attained. Validity is the quality of a data-gathering instrument or procedure that enables it to determine what it was designed to determine (Best, 1983,p.153). In other words, validity refers to the ability of a test to measure what it is supposed to measure. Validity is also

referred to as " the extent to which the procedure actually accomplishes what it seeks to accomplish or measure what it seek to measure" (Fox, 1969,p.367).

8.5.1.1 Reliability of the verbal and non-verbal tests of creativity

The test-retest reliability of the creativity scores and also the total scores were obtained on a small sample (N=75).

Table-8.5: Test-retest reliability of factor scores and the total creativity scores (N=75)

Creativity	Originality	Fluency	Flexibility	Elaboration	Total creativity score
Verbal	.856	.954	.931		.970
Non-verbal	.880			.910	.918

As will be seen the reliabilities of verbal and non-verbal scores and also total verbal creativity scores are high, ranging from 0.856 to 0.970. These values are highly satisfactory. Similarly all the reliabilities of the factor scores and also the total non-verbal creativity scores are high, ranging from 0.880 to 0.918.

The author of this instrument (Prof. Baqer Mehdi) has established the inter-scorer reliabilities of test scripts in the range of 0.751 to .925 (for verbal) and 0.725 to 0.910 (for non-verbal).

8.5.1.2 Validity of the creative thinking tests

Different researchers use different procedures to establish the validity of their creativity tests (Joseph, 1993). According to Treffinger, et al.,(1971) each instrument of a creativity test mirrors the particular set of beliefs and perceptions of its developer concerning the nature of creativity. Passi (1979), Venkat Rami Reddy and Balakrishna Reddy (1983), and Joseph (1993) have correlated creativity test scores with intelligence test scores obtained on Raven's Progressive Matrices (RPM) to establish the concurrent validity of the instrument. Misra (1986) validated his tests with teachers' ratings and the correlations with his creativity test scores.

The validity coefficients against the teacher ratings for each factor and total creativity scores as reported by the constructor are given in table 8.6. The validity coefficient for factor

Table-8.6 Validity coefficients for factor scores and the total creativity scores against teacher ratings

Creativity	Originality	fluency	flexibility	Elaboration	Total Creativity
Verbal	0.34**	0.40**	0.32*	-	0.39*
Non-verbal	0.33**	-	-	0.35**	0.39*

** = Significant at 0.01 * = significant at 0.05

scores and the total verbal creativity scores are high enough ($p<0.01$) to place confidence in the use of the test. The test constructor reported that higher correlations with teacher ratings are usually not obtained due to the unreliability of the ratings (Mehdi,1973, 85). Getzels and Jackson (1962) asked the teachers to rate all the students in the school on the given criterion. They found that "teachers favour high achievers who are high IQ's, but not high achievers who are highly creative" (p.31). So teachers' ratings may not be reliable.

Item Validity: Each item was scored for fluency, flexibility, elaboration and originality by the present researcher. The raw scores for each item were converted into T Scores (see Chapter-X, 10.1.0) with mean of 50 and SD 10, and were added up to get the total score for each item. The item scores were then correlated, first, with the total activity scores, and then with the grand total i.e., the total of all four activities. The correlations for each mediums of the students (English and Telugu) were also computed separately and presented in the same table.

Table 8.7 shows that for the whole sample (N=373)(1) the items in each activity

Table - 8.7: Correlation coefficients of test items with the activity total scores and grand total

Activity	Items	Verbal creative thinking						Items	Non-verbal creative thinking					
		Corr.With Ac.Tot			Corr.With Gr.Tot				Corr.With Ac.Tot			Corr.With Gr.Tot		
		EM	TM	Tot	EM	TM	Tot		EM	TM	Tot	EM	TM	Tot
I	1	.86$	.86$	.86$	.74$	.71$	.72$	1	.74$	.82$	.79$	.25$	.36$	.32$
	2	.74$	.66$	.69$	.69$	.53$	.61$	2	.65$	.69$	.67$	.21£	.32$	.27$
	3	.72$	.82$	.78$	.63$	.74$	.69$							
II	1	.82$	.76$	.79$	.69$	.60$	.64$	1	.30$	.48$	.41$	.30$	.48$	.30$
	2	.80$	.76$	.78$	.66$	.50$	.58$	2	.38$	.40$	.39$	.38$	.40$	.32$
	3	.76$	.67$	.72$	.66$	.46$	.56$	3	.27$	.43$	.37$	.27$	.43$	.27$
								4	.29$	.40$	.35$	.29$	.40$	.33$
								5	.43$	.44$	.44$	.43$	.44$	.38$
								6	.36$	.32$	.33$	.36$	.32$	.24$
								7	.29$	.41$	.37$	.29$	.41$	.28$
								8	.42$	.33$	.36$	.42$	.33$	.31$
								9	.36$	.47$	.43$	.36$	.47$	.35$
								10	.35$	.39$	.37$	.35$	.39$	.25$
III	1	.78$	.73$	.76$	.67$	.54$	.61$	1	.69$	.75$	.72$	.52$	.59$	.55$
	2	.83$	.70$	.75$	.70$	.48$	.58$	2	.82$	.86$	.84$	.63$	.67$	.65$
	3	.82$	.79$	.81$	.63$	.62$	.62$							
IV	1	1.00	1.00	1.00	.64$	.52$	.59$							

TM= Telugu medium(N=202) EM= English medium(N=171) Tot = Total (TM+EM)
$$ Perfect correlation $ Significant at 0.001 £ Significant at 0.01 @ Significant at 0.05

correlate highly with the activity total, indicating that together they are measuring the same thing. (2) The correlation with the grand total is also high, again pointing to the fact that the items are highly internally consistent. In regard to Telugu and English medium, all the item

scores were highly or moderately correlated with activity and grand total scores. The 'r' values were all significant (levels ranged from 0.05 to 0.001).

Correlations in Table-8.8 show a significantly high degree of relationship between the activities and the creativity scores. The correlations range from 0.58 to 0.86 for verbal creativity and from 0.40 to 0.80 for non-verbal creativity for the whole sample (N=373). For English and Telugu medium the verbal creativity range was 0.63 to 0.88 and 0.52 to 0.85; the non-verbal creativity range was 0.33 to 0.76 and 0.45 to 0.82 respectively.

Table - 8.8: Correlation coefficients between test activities and total scores of verbal and non verbal creativity.

Activity	Verbal creativity			Non-verbal creativity		
	English Medium (N=171)	Telugu Medium (N=202)	Total (N=373)	English Medium (N=171)	Telugu Medium (N=202)	Total (N=373)
I	.88$	.85$	.86$	.33$	.45$	.40$
II	.84$	.71$	.77$	.74$	.82$	.80$
III	.82$	.75$	.78$	.76$	.78$	.77$
IV	.63$	.52$	.59$			

$ Significant at 0.001

8.5.1.3. Factor Validity of Verbal and Non-verbal Creativity

The correlations between the different factors of verbal and non-verbal creativity, the total verbal, total non-verbal creativity, and composite creativity scores are given in table-8.9.

The correlations in the table-8.9 show a significantly high degree of relationship between verbal creativity factors and the total verbal creativity scores ($p<0.001$). The correlations range from .78 to .97. The inter-correlations range of the author (Baqer Mehdi, 1983) for verbal creativity ranged from .776 to .966 for urban and .435 to .828 for rural samples.

The correlations are much higher than would be expected on the basis of results obtained by Guilford in his factor analytic studies of the structure of intellect. That they are as high as this may be due to the high verbal component present in each factor.

All the correlations in Table-8.9 show significant degrees of relationship between non-verbal creativity factors and total non-verbal creativity ($p<0.001$ to $p<0.05$). The correlations range from 0.38 to 0.83. The inter-correlations reported in the manual are .533 to .875 for the urban and .356 to .604 range for the rural sample.

All the correlations in Table-8.9 show a significant degree of relationship between verbal creativity factors and non-verbal creativity factors ($p<0.001$ to $p<0.05$). The correlation between the verbal and the non-verbal tests of creativity based on the total creativity scores was found to be 0.33. The test constructor reported a correlation of .456 for

the urban and .356 for the rural samples.

This indicates that while the two tests are measuring the same construct, namely, creative, they provide somewhat different information about it. The test constructor recommends that both the tests should be used to give more complete information about the creativity of an individual. Validity studies indicate which type of creativity score is more specifically related to creative performance in a particular field (Mehdi, 1985).

Table - 8.9: Correlation coefficient among various factors of verbal and non-verbal creativity scores of the sample (N=373) and medium wise.

	Verbal creativity				**Non-verbal creativity**			
Factors	Originality	Fluency	Flexibility	Total	Originality	Elabo-ration	Total	Compo-site
V- Originality	-	.74$	.78$	.90$	.26$	.23$	.29$	.78$
V- fluency	.82$ (.78$)	-	.95$	.95$	.31$	.31$	.36$	.85$
V- flexibility	.84$ (.81$)	.98$ (.96$)	-	.97$	.34$	.32$	.39$	.87$
V-Total	.92$ (.91$)	.97$ (.96$)	.98$ (.97$)	-	.32$	.30$	.36$	.88$
NV- Originality	.21£ (.24$)	.22£ (.26$)	.20@ (.27$)	.22£ (.27$)	-	.47$	.86$	.65$
NV- Elaboration	.20£ (.21$)	.31$ (.30$)	.26$ (.29$)	.27£ (.28$)	.22£ (.38$)	-	.86$	.64$
NV- Total	.26$ (.27$)	.33$ (34$)	.29$ (.34$)	.31$ (.33$)	.79$ (.83$)	.77$ (.83$)	-	.75$
Composite (Verbal + Non-verbal)	.85$ (.81$)	.92$ (.88$)	.91$ (.89$)	.93$ (.91$)	.48$ (.58$)	.51$ (.58$)	.63$ (.67$)	-----

$ Significant level at 0.001 £ Significant level at 0.01 @ Significant level at 0.05

Note: In the table, the values **above the principal diagonal** are the correlations(r) of Telugu Medium (N=202) and the **values within the brackets** are the whole sample(N=373) correlations(r) while those **below the principal diagonal** are the correlations(r) of English Medium (N=171).

8.5.2.1 Reliability of the TES

A Cronbach Alpha is used to estimate the internal consistency index of a set of Likert scale items. This ranges between 0 and 1. Higher Alpha indicates high reliability of a test. All the 20 items were entered and the Cronbach Alpha[9] was calculated. The reliability coefficient of the TES was found to be 0.75 for the 20 items (for parts see table-8.10).

The other method the Spearman-Brown Split for reliability, can also be used to estimate reliability from a single administration of a single form of a test. The test is split into two halves; the first half is called odd items and second half even items. This produces

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[9] The Alpha values were calculated by the SPSS software package by using

formula $\alpha = k / (k-1)[1-\sum_{i=1}^{k} V_I / V_t]$ or $\alpha = k / (k-1)[1-\sum_{i=1}^{k} S^2_I / S^2_t]$

Where k= number of items; V_i(or s^2_i) is the variance of item 'i'

two scores for each pupil. Correlation of these two sets of scores yields the reliability coefficient. The reliability coefficient for the TES was 0.70. This coefficient indicates the degree to which consistent results are obtained from the two halves of the scale.

Table-8.10: Split-half reliability of TES(N=373)

Splites	Items	Alpha	Alpha for whole test	Spearman-Brown Split-half	
				For Two parts	For whole test
Part 1	10	.71	.75	.54	0.70
Part 2	10	.50			

8.5.2.2 Intrinsic Validity or Index of Reliability of TES

The intrinsic validity of a test is directly related to reliability. The degree to which a test measures what it measures may be called its "intrinsic validity". It is indicated by the square root of the reliability coefficient (Guilford,1965) and is also designated as the "index of reliability".

The correlation between a set of obtained scores and their corresponding true counter parts is given by the formula.

$$r_{1\infty} = \sqrt{r_{11}}$$

$r_{1\infty}$ = the correlation of obtained true scores.
r_{11} = reliability coefficient of the test.

So the index of reliability of the TES is $\sqrt{0.70} = 0.84$. Therefore 0.84 is the highest correlation, which the present TES is capable of yielding in its present form.

8.5.2.3 Content validity of the TES

The content validity of the TES was determined by six experts in the field of Education and Psychology (as explained in Chap-VI, 6.3.2.3). They were asked to comment first whether the items measured teacher encouragement in the classroom, secondly whether there was sufficient coverage of items and the language used. The items were scrutinised by the judges, who were conversant with classroom teaching and had knowledge of creativity and its development. The suggestions given by them were incorporated in to the TES before the final data collection. Some sentences were rephrased, although no new information was added.

V_t(or S^2_t) is the variance of total test for the 'k' items.

8.5.2.4 The construct validity of the TES items

The construct validity of the TES was established through Pearson's correlation. The internal consistency or homogeneity of the items involves the product-moment Pearson correlation of the items with the total scale scores. Hence, the Pearson correlations(r) between items and TES were computed. If an item is measuring similar traits to the main scale TES then it should correlate positively with it. The higher the correlation coefficient, the stronger the relationship and therefore the validity of the items.

The correlation matrix (Table-8.11) indicates that almost all the TES items had significant high correlations with the total scores of the TES. The correlation indices ranged between 0.23 and 0.58. The highest correlation was between item 10 and the total score, while the lowest was between item 15 and the total score. Item 10 was, " Does the teacher have good relations with students?" while item 15 was, "Does the teacher discourage you from following your own interests?"

Table-8.11 : Correlation coefficients between TES items and total score on TES

Item No.	Corr. with total score on TES	Item No.	Corr. with total score on TES	Item No.	Corr. with total score on TES
1	0.54	9	0.38	17	0.37
2	0.48	10	0.58	18	0.37
3	0.37	11	0.53	19	0.49
4	0.44	12	0.46	20	0.33
5	Deleted	13	0.50	21	Deleted
6	0.24	14	0.35	22	0.48
7	0.27	15	0.23		
8	0.42	16	0.49		

$ = Significant at 0.001 level (df=371)

Another more detailed analysis to examine the construct validity of the instrument, TES was attempted through factor analysis of all the 20 items. Firstly, Principal Component Analysis (PCA) was employed to extract the latent trait or the underlying factors of the TES items. The results of the PCA are presented in chapter-XI, 11.4.0. All the items tend to cluster together and all of them were loaded significantly on the factors that emerged. This provides some evidence for the validity of these items.

8.5.3. Reliability and Validity of the Interview data

According to Hammersly, M (1992,p67) 'Reliability refers to the degree of consistency with which instances are assigned to the same category by different observers or by the same observer on different occasions'.

In relation to the interview, care was taken that every respondent should understand the questions (in the interview schedule) in the same way. The answers were also coded. to

reduce error. Wherever possible, a group data-analysis session was held to listen to audio-recordings to compare the transcripts.

The responses for the open-ended questions were coded by an agreed set of categories. This pre-arranged coding strategy[10] was approved in the group data-analysis sessions with the assistance of other researchers and lecturers in the Psychology and Education. The Inter-rater reliability method[11] was used to ensure reliability of the interview data analysis, for this purpose two research students were trained to use highly standardised procedures and asked to code the transcripts independently. Their level of agreement was high.

8.5.4. Reliability and Validity of the Teachers Questionnaire (TQ)

The items of the teachers' questionnaire was based on the literature survey (Chap-II to V), the personal experience of the researcher and exploratory interviews. Reliability refers to the extent to which measurement results are free of unpredictable kinds of error (Henerson and etal,1978). Methods for demonstrating an instrument's reliability –whether the instrument is long and intricate or is composed of a single question- involve comparison of one administration with another administration to the same people. This is followed by calculation of a 'reliability coefficient'; a high coefficient shows stability, and a small coefficient shows the influence of error (p.146)

As it was not possible to ask teachers to answer the same questions on two different occasions, because of their busy teaching schedule, the researcher had no opportunity to conduct repeated measures of reliability.

While preparing the TQ the researcher took some precautions which affected the validity of the instrument. They concerned the clarity of directions, the wording of questions, and length of the questionnaire in the pilot study. The pilot study ensured that the items included in TQ yielded the information required, and gave an opportunity to the researcher to detect and remove ambiguities and to determine the range of possible answers.

Five experts[12] in the field of Education and Psychology determined the content validity of the TQ. The professor of education and special officer for textbooks, Govt. of

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[10] Pre-arranged coding strategy:- at the very beginning the present researcher developed some categories on the basis of pilot study results and from thorough text analysis of final data.

[11] Inter-rater reliability method this involves giving the same data to a number of analysts (or raters) and asking them to analyse it according to an agreed set of categories. Their reports are then examined and any differences discussed and ironed out.

[12] The same five experts mentioned in chapter VI, p. 93.

A.P, Hyderabad, also determined the validity of the instrument and the suitability of the culture and language of the questionnaire. They reviewed each item and their comments were very positive. They agreed that the items of TQ covered all the aspects of creativity and its development. Suggestions were made about rephrasing some of the statements which were ambiguous. No new aspects were added to the questionnaires. Some encouraging evidence for the validity of the new measure is provided by the results of the factor analysis of the main study data.

8.5.4.1 Factor Analysis of TQ

A more detailed analysis to examine the construct validity of the Teachers Questionnaire could be attempted through factor analysis of the items included in the TQ. Two basic empirical approaches are available to extract or generate a new set of factors. They are (1) Principal Component Analysis (2) Factor Analysis. In factor analysis, a mathematical model is set up, and the factors can only be estimated, whereas in component analysis we are simply transforming the original variables (or items) into a new set of linear combinations (the principal components). Both methods often yield similar results. But component analysis is a psychologically sound procedure and it is simpler mathematically, relatively speaking, than factor analysis (Stevens, 1992, p.375). Also, the factor indeterminacy issue associated with common factor analysis (Steiger, 1979) is a troublesome feature.

In the present study Principal Component Analysis and Varimax Rotation were applied to each batch of Likert-type items in the TQ, to examine the common trait or traits which would provide evidence for the validity of these items and justify their inclusion in the questionnaire (see e.g. Fryer, 1989). The purpose of rotation is to achieve a configuration of loadings having the qualities collectively known as simple structure which, loosely conceived, is the set of loadings that show the maximum number of tests loading on the minimum number of factors. The idea is that the fewer the factors that are involved in accounting for the correlations among a group of tests, the easier it is to invest those factors with psychological meaning (Kinnear and Gray, 1997, p.310) The factors are rotated to maximise the relationships between the variables and some of the factors. The most common method is Varimax, a rotation method which maintains independence among the mathematical factors (Ibid, p.310); this rotation is to clean up the factors (Kaiser, 1960) and generally makes interpretation of the resulting factors easier (Stevens, 1992, p.380). It is the default option in SPSS.

All the Likert-items in question 6 (part-D) were factor analysed to examine the

common trait or traits. Only factors having an Eigenvalue greater than 1 were considered. Altogether five factors were extracted which explained 66.9% of the variance. The factor-wise variations are presented in Table E1-T1 (see App. E1). The factors were called 'teaching for self-reliance, 'responsive', 'question-expanded thinking', 'building confidence and relations' and 'supportive environment'.

Similarly, in Part-D, questions 7, 8 and 9 were also subjected to factor analysis. For Q.no.-7, altogether 66.7% of variance was explained, three factors emerged and were labelled as ''lack of facilities', 'inadequate freedom' and 'lack of support' (E1-T2). For Question 8, 57.1% of variation was explained by two factors. They were labelled, 'unmotivated and lacking confidence', and 'passive and unequal abilities' (Table-E1-T3). For Question 9, about 75% of variance was explained and three factors were extracted. They were ' lack of recognition and stress, 'lack of knowledge of creativity, and 'lack of experience and confidence' (see Table-E1-T4).

When factor analysis was applied to Part E, a total of 60% of the variance was explained and four factors emerged. They were labelled 'permissive and stimulating', 'exposing to different activities', the 'creative teacher and his methods of teaching', and 'authoritative' (Table-E1-T5). For Part F, 64.7% of variance was explained and two factors were extracted. They were labelled 'scope for creativity in the curriculum' and 'suitability of curriculum (Table-E1-T6).

8.6.0 Summary

This chapter has described methodological issues. The scheme of the present research was explained under three broad classified variables: that is, Organisational, Background and cognitive and motivational characteristics of students.

The normative survey was selected as the research method, and a sample was drawn from nine schools by using different sampling techniques. The procedures followed for collecting data were explained in detail. The reliability of each instrument was established by applying a variety of methods. Similarly, the validity of the instruments was determined through the available validating approaches.

The succeeding three chapters (IX, X and XI) deal with the data analysis. The next chapter-IX is concerned with the analysis of teachers' interviews and questionnaire data.

Chapter IX

Analysis of Teacher's Questionnaire and Interviews

9.1.0 Introduction

This chapter is concerned with the analysis of the Teachers' Questionnaire (TQ) and interviews with the teachers. The analysis and interpretation of the teachers questionnaire (quantitative data) and interviews (qualitative data) will complement each other. The purpose of conducting the interviews was to collect more detailed information to strengthen and support the information collected through the TQ data, and to assist in validation. The design of the Interview schedule and TQ and scoring procedures were discussed in the previous chapter (VI).

9.2.0 The main results of the teachers questionnaire and interviews

9.2.1 Sources of knowledge about creative thinking

As already explained in chapter-VIII (8.3.2), 88 teachers completed the teachers' questionnaire and ten teachers were interviewed. Among the 10 teachers, one teacher had comprehensive knowledge of creativity, six teachers had good knowledge and the rest of the three teachers had some knowledge.

The interview data revealed that 8 teachers out of 10 had acquired their knowledge of creativity through teacher training. These teachers said that the topic of creativity was included in teacher training in Educational Psychology. A female teacher of biological sciences and male teacher of physical sciences said that it was mentioned in bio-Sciences and physical sciences while they were attending orientation classes by State Council of Educational Research and Training (SCERT) on the '*Improvisation of apparatus*'. The remaining two teachers had learned through books and practical and personal experience.

From Table 9.1 it is evident that a very high percentage of teachers (89.8) said that the development of creative thinking among the students was included in their teacher training. The X^2 value (55.68) indicates that this is a significant proportion at 0.0001 level. This topic was covered in Educational Psychology (51.3%), Mathematics (15.4%), Biological Sciences (12.8%) and English (12.8%). A very low percentage (1.3%) of the teachers said that CT+ was included in Art & Music.

From Table 9.2, it can be seen that a high percentage of the teachers (48.9%) acquired the knowledge about CT+ from their own interest in reading books and Journals (48.9) and special training programmes (44.7%). The rest of the teachers had acquired their

knowledge through attending seminars / conferences (23.4%), refresher courses (17%), from colleagues and friends (17%) and from teachers' guides & supplementary material (10.6). A small percentage of the teachers (4.3%) had acquired knowledge through listening to the radio and TV.

Table-9.1: Inclusion of creative thinking in teacher training

Q1: Inclusion of CT+ in teacher training.	Yes	79 (89.8)	X^2
	No	9 (10.2)	55.68$
Q2: CT+ included in the subjects	f	% of cases*	
1. Educational psychology	40	51.3	
2. Mathematics	12	15.4	
3. Bio-Sciences	10	12.8	
4. English	10	12.8	
5. Physical sciences	9	11.5	
6. Social studies	7	9.0	
7. Telugu	6	7.7	
8. Hindi	2	2.6	
9. Curriculum Development & Technology	2	2.6	
10. Philosophical foundation of education	1	1.3	
11. SUPW	1	1.3	
12. Art & Music	1	1.3	
	101*		

CT+ = Creative thinking; * = Total Multiple responses (78 valid cases); $ = Significant at 0.0001
SUPW = Social Useful Productive Work
Note : Percentages were calculated on the basis of total valid cases but not on total multiple

Table-9.2: Sources of acquired knowledge about the development of creative thinking

Sources	f	% of Cases
1. Own interest in reading books & Journals	23	48.9
2. Special training programmes	21	44.7
3. Seminars / Conferences	11	23.4
4. Refresher courses	8	17.0
5. Colleagues and friends	8	17.0
6. Teacher guides & Supplementary material	5	10.0
7. Listening to Radio and TV	2	4.3
	78*	

* = Total Multiple responses (47 Valid cases)
Note : Percentages were calculated on the basis of total valid cases but not on total multiple responses.

Further, the teachers (N=40) who had attended special training / seminars / conferences / refresher courses stated the names of the course organisers and nature of the content of the course. Table 9.3 demonstrates that 95% of the teachers said that emphasis was given to CT+ in their special training /seminars/ refresher courses. The same table reveals the list of educational organisations providing courses for teachers. A majority of the teachers (28.9%) were trained in Colleges of Education, which are particularly meant for training secondary teachers. 15.8% of teachers were trained from each of the following organisations: SCERT, APPEP[1] and DEO. The other organisations, NCERT and NPE 86,

1 The Andhra Pradesh Primary Education Project was implemented during the period Jan.1985-May

trained 10.5% and 7.9% respectively. The DIETs[2] and Director, Bala Bhavan organised a very small percentage (2.6%).

Table-9.3: The special training programmes / seminars / refresher courses attended by the teachers (N=40)

Emphasis of CT^+ in school children in training programmes / refresher courses attended	Yes	No
	38 (95%)	2 (5%)
Courses organised by	f	% of cases
1. Colleges of Education	11	28.9
2. State Council of Educational Research and Training (SCERT)	6	15.8
3. Andhra Pradesh Primary Education Project (APPEP)	6	15.8
4. District Educational Officer (DEO)	6	15.8
5. National Council of Educational Research and Training (NCERT)	4	10.5
6. National Policy on Education-1986	3	7.9
7. District Institute of Education and Training(DIET)	1	2.6
8. Director, Bal Bhavan	1	2.6
	38	

CT^+: Creative Thinking

The content of the courses (Table 9.4) conducted by the organisations (Table-9.3) was received as relevant & satisfactory (46.7%) and based on learning by doing (20%). Courses were also helpful to in demonstrating new trends in teaching (6.7%), and identifying & developing CT^+ of students (6.7%). A very small percentage of teachers said that the content was designed to attract the students to understand the subject (3.3%), relevant to problem solving (3.3%) and encouraged group discussions (3.3%). Only 6.7% of teachers said it was not relevant to the classroom teaching.

Table-9.4 : The relevance of the course content to the attended by the teachers (N=40)

The content of the course was	f	%
1 content was satisfactory & relevant to classroom teaching	14	46.7
2 Based on learning by doing	6	20.0
3 To improve teaching methods in a new trends	2	6.7
4 Identifying & Developing CT+ of students	2	6.7
5 To attract students to understand the subject	1	3.3
6 Very relevant to the problem solving	1	3.3
7 Encouraging group discussions	1	3.3
8 Suitable to the needs of the learners	1	3.3
9 Not relevant to classroom teaching	2	6.7
	30	

In the interviews, four teachers said that they had attended some special training programmes organised by the National Institute for the Mentally Handicapped at Delhi, SCERT and APPEP at Hyderabad. One teacher reported that he had received 'inputs' through lectures on Intelligence and Creativity given by Psychology professors. One of the

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1989 (for more details see Appendix-A1 (sec. A1.3).
2 These Institutes are meant for train the primary teachers and Organises some special programmes for teachers (see Appendix-A1 (sec.A1.3).

teachers, who had not attended any training programmes said *'we haven't had any opportunity so far'* to attend any training courses.

In the interviews, the teachers were asked about their knowledge of creative techniques and their application in teaching. Three teachers said they had some knowledge of brainstorming but had not applied it in the classroom. The rest of the teachers said they had no knowledge about brainstorming.

A Physical Sciences and Mathematics Male Teacher (PS+M MT6) said ,*"We were told something about brainstorming. In brainstorming some brief discussion on a problem is made by a whole group and in a relaxed condition, a free manner, whatever comes to mind even a silly solution but in a limited time. All unusual answers are put together and a novel solution is obtained".*

He further commented, '*We were taught about and discussed creativity in a general way but not concerning the subject. When we come to the subject here I think a teacher required a few model lessons in a particular subject, keeping in mind developing creativity in the child pertaining to that particular subject. As I am dealing with maths and science we need a few model lessons and along with that some materials that have been acquired, like books and some lessons on how creativity can be developed'.*

While explaining his failure to apply the technique in the class:

> *"First of all, we are supposed to complete our syllabus and there is a problem of the strength of the class. For applying this brainstorming technique, I think, it requires separate time for the teacher, he need not concentrate on teaching his subject".*

A male Mathematics teacher (M MT4) and female Biological Sciences teacher (BS FT8) said that *they had also only 'theoretical knowledge' of* creativity.

9.2.2 Support needed for teachers in order to improve their knowledge about Creative Thinking

While talking in the interviews about the support they needed, eight teachers out of ten suggested that *some special training was necessary for teachers.* In addition to that three teachers said that *seminars/ refresher courses were required* and another three said *books*. Of the other two teachers, one suggested *'frequent training classes'*, and other suggested '*lectures from eminent psychologists'* as important for teachers to improve their knowledge about creativity.

A male teacher, teaching English and Biological Sciences (E+BS MT3) strongly emphasised training for teachers:

> *A special training for teachers on creative thinking is required. We, most of the time in our training (B.Ed), oriented ourselves in the methodology of teaching subjects rather than psychological factors. We need special orientation from colleges of education and eminent persons from the field of Psychology, and also people who have worked with students for the past 10 to 15 years, who have a lot of experience with students, people from SCERT and NCERT, who have extensively worked in this area. If they give us their theoretical knowledge and their research findings, I think we will be better able to use it in the classroom situation.*

A male Mathematics teacher (M MT4) also emphasised creativity training for teachers and was much worried about the lack of knowledge among teachers:

I think we must be trained. We should be trained, particularly in creativity, by experts in Psychology and they must do it in a form of demonstration. They should demonstrate and they must also tell where this technique can be used, what type of techniques we have to use, in which subject, what method can be adopted to improve creativity among the students. Some pupils will have that talent but they will not be able to utilise it, because the teacher is not interested in that. So I think all teachers should be trained in that. I think, in my opinion, many of our teachers do not know what creativity is and what is creative thinking, whether it is going to help the students or not. No, I don't think that they know! There are many teachers who make their students passive learners. There is no question of creativity in their class.

The data collected through the TQ also reflects the support they perceive they need. But the range of responses from the TQ was wider than the interview data.

In table 9.5, the responses given by the teachers were categorised into 4 broad categories. The highest percentages of sub-categories only are discussed here. The majority of the teachers reported needing support to improve their knowledge about CT+ through special training programmes (41.1%), seminars and symposia (29.5%), books & journals (27.9%), refresher courses / orientation programmes (23%) and adequate instructional material (21.3%).

Table-9.5: Support needed for teachers to improve their knowledge about CT^+

To Improve knowledge and understanding of CT^+	f	% of the cases
1. **Training and Related programmes**		
1.1 Special training programmes for teachers	25	41.1
1.2 Seminars & symposia on relevant topics	18	29.5
1.3 Refresher / orientation programmes	14	23.0
1.4 Workshops	2	3.3
1.5 Extension lectures by experts in the field	2	3.3
2. Instructional and Related material (curricular and co-curricular)		
2.1 Books, journals & pamphlets on CT^+	17	27.9
2.2 Adequate instructional material	13	21.3
2.3 Teacher guides	4	6.6
2.4 A good laboratory facility	3	4.9
2.5 A good library facility	2	3.3
2.6 Extra periods allotment	1	1.6
3. Organisational and other agencies		
3.1 Moral support from administration (i.e. headteachers and other higher officials)	4	6.6
3.2 Funds for project works & educational tours	3	4.9
3.3 Moral support from society	2	3.3
4. **Not requiring any support**	1	1.6
	111*	

CT^+ = Creative Thinking; * = Total multiple responses (61 valid cases)
Note : Percentages were calculated on the basis of total valid cases but not on total multiple responses.

Moral support from the administration (6.6%), good laboratory facilities (4.9%), and funds for project work & educational tours (4.9%) were also needed. A few teachers said that they need workshops, library facilities, extension lectures, and support from society (3.3% each). Need for extra period allotment and those not requiring any support were scored as1.6% each.

9.2.3 Teachers' definition of Creative Thinking (CT)

The various definitions of creativity given by the teachers in the interviews are presented in the Text Box – 9.2.3.1. These qualitative definitions reflect similar definitions to those in table-9.6.

The social studies teacher (SS FT10) described creativity as 'an inspiration' while the mathematics Teacher (MFT5) said it was 'an imaginative thought'. The male teacher of English (E MT2) and the social studies teacher (SS MT9) defined creative thinking as 'seeing connections' and 'combining ideas' respectively. The bio-sciences teacher (BS FT8) simply described it as 'stimulating inventiveness'. The other male teacher of Mathematics (M MT4) thought in terms of 'intuition'.

A female Telugu teacher (T FT1) thought that creative thinking is a 'thinking process' while an English and Biological Sciences teacher (E+BS MT3) described creativity as 'divergent thinking'.

A Physical sciences teacher (PS MT7) believed that creativity is to 'dig out new ideas or make-up new things'. A Physical Sciences and Mathematics teacher (PS+M MT6) also gave similar definitions that creativity is to 'create or produce new ideas'.

The TQ data in the table 9.6 demonstrates a range of teachers' views on creative thinking. The teachers (N=88) were asked to rank 15 items in the TQ in their order of importance from 1 to 15 according to their view of CT^{+}. The scores assigned to each aspect

Table-9.6: The Teachers' definition of creative thinking

Creative thinking is	Mean score	SD
1. Inspiration	61.41	15.93
2. Imagination	61.28	16.72
3. Original ideas	58.00	15.70
4. Self-expression	56.85	17.70
5. Thinking process	56.83	17.90
6. Divergent thinking	49.82	17.37
7. Innovation	49.24	12.91
8. Combining ideas	48.69	15.93
9. Solving problems	47.31	14.64
10. Seeing connections	46.63	13.60
11. Intuition	45.54	16.56
12. Valuable ideas	44.43	20.58
13. Invention/Discovery	44.30	14.27
14. Aesthetic products	40.18	24.27
15. Unconscious process	28.42	13.18

of creative thinking were used to calculate mean scores and SDs. The conversion of ranks into scores and the calculation procedure is explained in Appendix D2.

Inspiration and Imagination is placed first (each mean=61); Original ideas (mean=58) is second; self-expression and thinking process (each Mean=56), and Divergent thinking and Innovation (each Mean=49) were placed third and fourth respectively.

Unconscious process was the least supported attribute of creativity.

Text Box :9.2.3.1. Definition of Creative thinking –Teachers' Views

While looking at any object or picture or material, getting stimulated, and generating many kinds of thoughts in oneself. To bring out these thoughts which take shape or images/ concepts is called creative thinking. **– Female Telugu teacher (T FT1)**

Creative thinking is something, which comes out instantly, which is not learned earlier. It is like an art. It flows out spontaneously connecting the things (articles or problems) available in the field. **- Male English teacher (E MT2)**

Ability in giving unique responses, pursuing the problem in divergent way or something innovative. **- Male English and Biological science Teacher (E+BS MT3)**

Creativity... according to me, creativity is an extra ability in the students for doing practical things. Creative children will be intuitive. It means they think in terms of intuition. They don't accept what others say unless they confirm it by themselves. **– Male Mathematics teacher (M MT4)**

Creative thinking is an imaginative thought. **– Female Mathematics teacher (M FT5)**

Creative thinking is an ability of an individual to create or produce new ideas or results. It distrusts the existing conventional, traditional and customary ideas. **- Male Physical Sciences and Mathematics teacher (PS+M MT6)**

Creative thinking means to think, to dig out new ideas or make-up new things, not only in one aspect but in all fields, in all subjects and exhibit / publish the results publicly. **- Male Physical Sciences teacher (PS MT7)**

Creative thinking is just the practical application of the mind for developing the interest in satisfying the present day requirements in the field of science and technology. It is simply described as the stimulation of inventiveness. **- Female Biological Science teacher (BS FT8)**

Creative thinking is combining ideas and concluding the results. **- Male Social Studies Teacher (SS MT9)**

Creativity means an inspiration. **– Female Social Studies teacher (SS FT10)**

9.2.4 Development of creativity through teaching – teachers views.

Through the interviews, it is quite clear that all the teachers agreed that creativity can be developed through teaching. While responding to this question, an English teacher (EMT2) said,' *Creative thinking can be developed through teaching by the effective use of the "law of exercise". Students should be exposed to new problems to extract new and unfamiliar solutions. Students with creative thinking should be identified and motivated. Teachers should boost*

their confidence by giving a variety of problems constantly'.

A mathematics teacher (M MT4) explained how teachers can develop creativity:

> *It all depends on the teachers. Different teachers will have a different knack, and adopt different methods. First of all they have to identify which children are creative. As I said, all children are not creative. They may be intelligent but they may not be creative because creativity differs from intelligence to a great extent. So they must adopt certain methods and improvisations. As a science teacher I suggest, they must ask the students to give a rough idea about a certain improvisation and ask them to implement and develop it. So that will help a long way, they will understand the theory and they will perfect that after they create a certain object, a certain gadget and a certain device.*

Two teachers, a Mathematics teacher (M FT5) said, *'By asking divergent questions in teaching'* and a Physical Sciences and Mathematics teacher (PS+M MT6) said, *'giving more scope to students to ask about their doubts'*. The other Physical sciences teacher (PS MT7) said *'By asking students to prepare some apparatus. For example if you ask them to prepare spring balance. Some children may use rubber instead of a spring, realising the mechanism of elasticity.*

A Biological science teacher (BS FT8) said that being a professional by giver of information, a teacher could only provide CT during teaching. A male teacher, teaching social studies (SS MT9) said to 'some extent we can develop CT^{+} through teaching. A teacher of English and Biological Sciences (E+BS MT3) responded that *"It is not only developed through teaching but it can also be developed through training in some activities or by organising some programmes. So they will become motivated"*.

According to the Telugu teacher (T FT1) creativity can be developed through picture drawing and playing with objects. Another teacher of social studies (SS FT10) said, *'By asking questions, using visual aids, discussions and telling the life histories of great persons'*.

9.2.5 Can all children be taught to be creative thinkers? –Teachers' views

Five teachers out of ten said it is not possible to develop creative thinking among all students. The remaining five teachers agreed that creativity can be developed in all children but certain conditions must be fulfilled. A female Biological science teacher (BS FT8) said, 'it is possible when teachers and parents co-operate with the child'. A male Physical Sciences and Mathematics teacher (PS+M MT6) responded positively and said, *"Yes. It is possible, because every normal child has some ability to think and if properly treated this means creative thinking that is divergent thinking. I think, it is possible to teach every child to be a creative thinker"*.

A similar view was also expressed by a Mathematics Teacher (M MT4) said, *"Well...an element of creativity is there among all students. That level can be improved and they can be trained to be creative thinkers but levels will definitely differ, because I imagine that creativity is*

an inborn trait but it can be polished. It can be nurtured. It can be bettered, if not hundred percent, to a certain extent, to the best of the ability of the child".

Two teachers expressed different and extreme views. They were:

> *It is a difficult subject. We can't say that every child can be taught to be a creative thinker. It depends on the school environment and the living conditions of the students at home. A poor child with his empty stomach can't think. He always thinks, how to get food first? A child with all facilities (from a rich family) may try to think creatively and their parents also encourage developing this type of thinking. It also depends upon the teachers' encouragement.* ***-(PS MT7)***

> *It is a very controversial issue. What I feel is that some students may not have creativity. But all creative children may not be intelligent. And also all intelligent pupils may not be creative. When we see some of the literature, they say all people have creativity. Creativity shows or manifests in different areas. Some show creativity in arts, some shows it in sports and some show it in literature. So maybe all students have creativity; the only thing is to identify them and we have to channel them for their better life and for their constructive things.* ***-(E+ BS MT3)***

9.2.6 Intelligence and Creative Thinking – Teachers' views

In the interviews the teachers were asked to distinguish between intelligence and creativity. If they thought that these were two different attributes then they were asked to explain how they were different. This question was not asked in the Teachers Questionnaire.

From the data presented in Box 9.2.6.1, it is evident that except for one Biological Sciences teacher (BS FT8), all the teachers perceived that intelligence and creativity are different. As a Telugu teacher (T FT1) described it *'intelligence is a skill, and creativity means 'imagination'*. According to an English teacher (E MT2), intelligence is the capacity for retention and reproduction of knowledge and creativity is an inborn talent. The view of the English and Biological teacher (E+BS MT3) recognises that *'this is a very controversial issue'*.

A mathematics teacher (M MT4), who possessed a Master's degree in teaching, recollected his reading and said that 'all intelligent people need not be creative but the other way round is correct'. According to a PS and Mathematics teacher (PS+M MT6) who also has a Master's degree, intelligence is synonymous with convergent thinking and creative thinking is synonymous with divergent thinking. A Social Studies teacher (SS MT9) also expressed a similar view: that intelligence is some sort of extraordinary knowledge, and creative thinking is divergent thinking.

Two teachers, of mathematics (M FT5) and Social Studies (SS FT10), felt that Intelligence and creativity are different. A Physical Sciences teacher suggested that it depends how we measure them.

A Biological science teacher (BS FT8) expressed a different view in comparison

with all of the above teachers. She said, *'both are implications of knowledge and they are processed in the mind, so there is not much difference between them'.*

Text Box: 9.2.6.1.Intelligence and creative thinking-Teachers' views

They are separate aspects. Creativity means imaginative thinking. Intelligence means skill.
- Female Telugu teacher (T FT1)

Intelligence and creative thinking are two different aspects. Intelligence is the capacity to understand, retain and reproduce the given knowledge, whereas creative thinking cannot be learned. It is a born talent. Creative thinkers are born, not made.
- Male English teacher (E MT2)

No. This is what I heard, what I read from books, there is no correlation between intelligence and creativity. A creative child may not be intelligent and at the same time an intelligent student may not be creative. This is a very controversial issue.
- Male English and Biological science teacher (E+BS MT3)

No, I think they are different. Intelligence, as we know, is some thing to do with your I.Q (Intelligent Quotient). So all intelligent people need not to be creative but the other way round is correct, this means all creative thinkers are those who have creativity; they are intelligent. So one side is true, so intelligence is required for being creative but all intelligent people need not be creative.
– Male Mathematics teacher (M MT4)

Creativity and intelligence are different aspects. **- Female Mathematics teacher (M FT5)**

In earlier days creativity and intelligence were synonymous. Intelligent people were considered to be creative also but when it comes to my view, creativity and intelligence slightly differ. For example creativity is synonymous to divergent thinking and intelligence is synonymous to convergent thinking. In the present system, convergent thinking is given a lot more importance than divergent thinking. **- Male Physical Sciences and Mathematics teacher (PS+M MT6)**

In my view creativity and intelligence are different aspects. They should be considered as two separate aspects. Mainly, it also depends on how we measure creativity and intelligence to say whether they are the same aspects or different. **- Male Physical Sciences teacher (PS MT7)**

Intelligence is an ability to learn and understand. Creative thinking is ability to express ideas only. Both are aspects (same) of the mind's activity where application of knowledge is required. Hence there is not much difference. **- Female Biological Science teacher (BS FT8)**

Intelligence is some sort of extraordinary knowledge and creative thinking is divergent thinking or combining ideas. **- Male Social Studies teacher (SS MT9)**

Creativity and Intelligence are different aspects. **- Female Social Studies teacher (SS FT10)**

In response to the question, are all intelligent students creative? five teachers said *'No'* and two said *'Not always'*. The other three teachers expressed different views, a

female Telugu teacher (F FT1) said, 'All intelligent students may possess at least some creativity'. According to the Physical Sciences and Mathematics teacher (PS+M MT6) *'It need not be true! That is, an intelligent child may not be creative and a creative child may not be intelligent. Because intelligence and creativity have a very low correlation'.*

A physical sciences teacher (PS MT7) explained the relationship between intelligence and creativity referring his classroom experience:

"When I observed some of the students in the class who were treated as "intelligent students" by many of us on the basis of their academic record, they lacked creativity. The creative children fail to reach the top of the class (securing highest marks), because their ideas, their energies are rather diverted. Due to this divergence they lose their interest in studies so that they may not be intelligent. If we take marks as a criteria for intelligence, naturally creative children score less marks. We observe a deficiency of creativity in those students who score highly in academic achievement i.e., marks".

Further, he explained how the creative children are victims in the examinations:

"The creative students may write their answers in a different way or express/explain in different ways for the same question. Here teachers should pay attention and encourage the creativity of the student. If the teacher crosses out the answer which is divergent and not exactly the same as in the textbook, it is the fault of the teacher but not the student".

9.2.7 Teachers' opinion towards school subjects and creativity

All ten teachers interviewed in this study disagreed that creativity is developed only in the teaching of the subjects Arts and Music.

A male teacher of physical science (PS MT7) posed the question, "*Why should we suppose that creativity is only in Arts and Music? It is a wrong assumption that creativity can be developed only through arts and music. There are so many subjects. Even in science, a student can have a scientific temper, he can make a robot or crane by combining all the objects he has. This also can be said to be creativity".*

As another physical sciences and mathematics teacher (PS+M MT6) said, "*Of course, teaching Arts and Music may have the intention of developing creative thinking but with other school subjects also we can develop creative thinking, like Mathematics and Science".*

The mathematics teacher (M MT4) was optimistic about the development of creativity in all subjects. He said, *' This factor can be improved in all subjects. There is no subject... in even, I think in Physical Education training also there is every chance that creativity can be induced among the students'.*

An English and biological teacher (E+BS MT3) said, *"No, it is shown in different areas, not only arts and music but also it is shown in different areas".* A similar view was also expressed by the biological sciences teacher (BS FT8) that "*Creativity can be developed not only in Arts & Music but also in almost all fields of life, in the aesthetic fields*

and also in the teaching-learning process".

Asked to indicate to school subjects which play a key role in developing creativity, four out of ten said, 'all subjects'. Among them, a mathematics teacher (M MT4) elaborated that "*Yah! In all subjects, All subjects, particularly in drawing, arts... because creativity is a general term. It's not associated with anything, a person who has skill can create wonderful things though he may not be educated but he will create. One who is educated of course has got better, more chances of doing these things".*

Four more teachers said, 'mathematics', in addition to mathematics two teachers said that Science would also develop creativity. Surprisingly, among the four teachers, two were teaching subjects other than mathematics that is English and social studies.

A female biological science teacher (BS FT8) said that crafts and manual training can also play a key role in creativity development. A male teacher, teaching English and biological sciences (E+BS MT3), said that '*other subjects, science, literature (English) and also sports could also be creative. Para-academic areas like projects, seminars, discussions, debates, elocution, and self-expression, role-play also play a vital role, as well as arts and music'.*

From the Teachers' Questionnaire (table-9.7) it is quite clear that the teachers agreed (77%) that creativity can be promoted by all the school subjects, not only art and music. The X^2-value (25.39) shows significance at 0.0001 level. Science (58%) and mathematics (30%) are considered to be the subjects which contribute most, followed by Social Studies (28%). 20% of the teachers named all subjects, 8% SUPW and 6% extra-curricular activities. A very small percentage of them named all languages (4%); Telugu (2%) and Games (2%) will contribute in promoting creativity.

Table-9. 7: Teachers' opinion concerning the subjects which help in the promotion of creativity

Q: Do you think that only the subjects like art and music promotes CT+?	Yes	20 (23.0%)	X^2
	No	67 (77.0%)	25.39$
The subjects promote creativity in the high school curriculum	f	% of cases	
1. Science	29	58.0	
2. Mathematics	15	30.0	
3. Social studies	14	28.0	
4. All Subjects	10	20.0	
5. Social Useful Productive Work (SUPW)	4	8.0	
6. Co-curricular activities	3	6.0	
7. All languages	2	4.0	
8. Telugu	1	2.0	
9. Games	1	2.0	
	79*		

* = Multiple responses (50 valid cases) ; $ = Significant at 0.0001 level

Note : Percentages were calculated on the basis of total valid cases but not on total multiple

9.2.8 Teachers' assessment criteria for identifying creative children in the classroom

In the interviews with the teachers it was revealed that all the teachers (100%) felt able to identify creative children in their normal traditional classroom teaching. The criteria they gave for the identification of creative children in the classroom are now discussed.

A Telugu teacher (T TF1) identified creative children on the basis *of 'students' interests and skills'*. A social studies teacher (SS MT9) said, *'on students' responses'*. A teacher of English (E MT2) believed that *"the child who gives different (entirely new and different) solutions to problems is creative".*

Another Social studies teacher (SS FT10) identified children through their performance in competitions for example essay writing, drawing and painting, or Quiz etc.,. A biological science teacher (BS FT8) identified them on the basis of the expression of children's inborn talent as shown through paper and cane handicrafts and needlework crafts (for girls).

A PS and mathematics teacher (PS+M MT6) explained his observations about how creative children are curious in class:

When we start general discussion or the subject is being taught, these students are very curious. They want to find out what would be next? What sir would be explaining? They will try to find out novel ideas, which they will apply in daily life.

A teacher of English and BS (E+BS MT3) explained his classroom experiences which are similar to those described above:

'The questions they pose are very unusual. At that moment I might not able to give an answer because of other factors, but at the end of the class I realised that the questions asked by these students were really of a very creative nature. In my Biology class, they ask me questions like, why this is like this? Why not like this? Is there any other possibility to do this? or they suggest alternations to be made. Even in language, they always try to see some other equivalent meanings. If I ask them a question, they will give an answer in a different way but when we look into that at another level or another angle, we see that answer is correct. I feel that this thinking may be reflective or may be divergent.

Another teacher of PS (PS MT7), shed light on his practical experience with creative children:

I generally recognise creative children. When I start discussion on anything, they give a variety of responses. This is one way of identifying children. The other way is by asking the students to prepare something. For example we could explain how a lever functions. Then ask the students, can you use this in a different way? Do you make this type of thing? When we ask this type of questions, children start thinking about it. The creative children never leave it easily and take it as a challenge. They will come up with something within two to three days.

A mathematics teacher (M MT4) said, *'I have identified them but I cannot do justice to them, as certain factors are necessary, certain requirements are there which we alone can't fulfil. They pose completely different questions, extraordinary questions, they talk in terms of doing things. When we state some theory about some thing, then we always have questions from them. Some inquisitive questions, which will make us, which, will force us to think so that we can easily identify them. Of course they can be intelligent. We can say that the students are intelligent but the questions that they pose may not be relevant to classroom teaching. So sometimes, on one or two occasions I had to ask*

for pardon from the students and say that I will be telling you about this after thinking it over the next day. So their questions indicate that they have a creative mind and we can nurture them. They will give ideas, which a teacher may not have.

From the Teachers' Questionnaire (table 9.8) also it is evident that 82.1% of teachers feel capable of identifying the creative children in their regular classrooms, and only 17.9% feel unable to identify them. They were also given criteria for identifying creative children in their classroom. The responses were categorised into 5 major

Table-9.8: Criteria for identifying creative children in the classroom

Q. Have you identified any creative children in your classroom?	Yes	69 (82.1%)
	No	15 (17.9%)
	X^2	34.71$
Criteria for identifying creative children	f	% of cases
1. Students' performance in curricular and non-curricular activities		
1.1 Preparation of different types of models	8	13.6
1.2 Cultural activities	5	8.5
1.3 Drawing and painting	5	8.5
1.4 Writing imaginative stories	3	5.1
1.5 Assignment test	2	3.4
1.6 Writing songs of their won	1	1.7
1.7 Writing essays of their own	1	1.7
2. Students' classroom questioning		
2.1 Students' asking unusual / thought provoking questions	5	8.5
2.2 Students' raising genuine doubts	2	3.4
3. Students' classroom responses		
3.1 Gives novel ideas / solutions rather than routine ideas	9	15.3
3.2 Curious to know about new topics	7	11.9
3.3 Gives immediate responses	6	10.2
3.4 Gives unusual responses	5	8.5
3.5 Gives original and valuable ideas	3	5.1
3.6 Gives divergent responses	3	5.1
3.7 Solve problems easily	3	5.1
4. Students' personality characteristics		
4.1 Student's interests & aptitude	4	6.8
4.2 Student's habits	1	1.7
4.3 Student's Intelligence	1	1.7
5. Through teacher initiation		
5.1 Asking questions by teacher	3	5.1
5.2 Encouraging open discussions	2	3.4
5.3 Keen observation and gives attention	1	1.7
	86*	

* = Multiple responses (59 valid cases); $ = Significant at 0.0001 level.
Note : Percentages were calculated on the basis of total valid cases but not on total multiple responses.

categories.

The teachers identify creative children on the basis of them giving novel ideas or solutions rather than routine ideas (15.3%), preparing different types of models and crafts (13.6%), curiosity to know about new topics (11.9%) and giving immediate responses

(10.2%). 8.5% of teachers responded that identification occurred through cultural activities, drawing and painting, ways of asking unusual or thought provoking questions and giving unusual responses.

Students' interests & aptitudes (6.8%), writing imaginative stories, giving original and valuable ideas, divergent responses and solving problems easily (each 5.1%) were also considered as criteria for the identification of creative children.

9.2.9 The importance of creativity and reasons given by the teachers for its development in school children

The data showed that of the teachers interviewed all recognised the importance of creativity. All teachers positively responded that the improvement of creativity among school children was necessary for their better life in the future. The teachers' views regarding the importance of creativity are presented in the Text Box No. 9.2.9.1.

A female teacher of Telugu (T FT1) said, *'it is necessary in everyday life and for the future too'*. An English and BS teacher (E+BS MT3) perceived that creative children may show alternatives or make alterations to the existing system or may give new ideas to the world. So creativity is useful not only for the student as an individual but also for society.

Similar views were also expressed by the PS and mathematics teacher (PS+M MT6), and a physical sciences teacher (PS MT7) that '*Highly creative people are very useful to our country*'. However not all agreed. 'It is needed but not so important' (SS MT9).

An English teacher (E MT2) said it was important to '*polish inherent talent'*. Two female teachers, one of mathematics (M FT5) said, *'it helps children to adapt and improve themselves in an ever changing environment and challenges the world'* and the other a biological sciences teacher (BS FT8) suggested that it was important '*to achieve certain goals of life in the field of education.* A male teacher of mathematics (M MT4) said that *'it is not always important but the development of creativity is the duty of the teacher.*

Another female teacher of social studies (SS FT10) expressed her feeling that "*if we develop creative thinking in children their thinking ability and imagination will be increased and lead to novel views".*

The Teacher's Questionnaire data (table-9.9) reflects that of the interviews. Most teachers agreed that it was important to develop creativity (88.6%), 9.1% said it was moderately important but only 2.3% said it was not very important and none of the teachers

said it was not at all important. The reasons given for the development of creativity may be divided into 4 major categories. They are presented in Table-9.9.

Text Box No: 9.2.9.1 Importance of creative thinking in school education

Yes. Creativity is very necessary to students in everyday life. It is also necessary in future life, so the development of creativity is needed from a young age.
– Female Telugu Teacher (T FT1)

Yes. It is important, hidden (talent) like diamonds among the stones can be polished and made to shine brightly. **- Male English Teacher (E MT2)**

Yes. It is important. This level of students' creativity is nurtured and promoted. If it is channelled properly, tomorrow the same students' may go on to give new ideas to the world. They may show some alternatives/alterations in the existing system or something innovative in the world. They may bring changes in existing system or in the unit. If this creativity is properly nurtured at school level then they will develop through out same attitude and develop a scientific temper. This will be useful for him not only as a person but also it is useful for society.
- Male English and Biological Science Teacher (E+BS MT3)

Very important, I think that is the duty of the teacher. Over looking it (creativity) he or she, not taking in to account, he/she is not doing full justice to the students. Of course creativity will not be there among all students. From an academic point of view they may have certain skills, certain creative abilities, which if we do not find out if we do not discover I think it's a shortcoming of the teacher. So definitely creativity will be there. It can be developed
– Male Mathematics Teacher (M MT4)

It is very important. It helps children to adapt and improve themselves in the ever-changing environment and challenges of the world. **– Female Mathematics Teacher (M FT5)**

Yes. It is aiming the allround development of the child, and in every child some measure of creativity exists. It should be nurtured. So that each individual child is unique and helpful to the society. **- Male Physical Sciences and Mathematics Teacher (PS+M MT6)**

Developing creativity among the students is the most important. That students pass with first class results is not our only aim. If you develop creativity among the students tomorrow it will be very useful to our country. We need highly creative people in big industries, research and development areas. **- Male Physical Sciences Teacher (PS MT7)**

Development of creative thinking among school students is important as it keeps the student motivated to be on the track to achieve a certain goal of life in the field of education.
- Female Biological Science Teacher (BS FT8)

The development of creative thinking among the students is needed but not so important.
- Male Social Studies Teacher (SS MT9)

Yes. If we develop creative thinking in children their thinking ability, imaginative ability will be increased and lead to novel views. **- Female Social Studies Teacher (SS FT10)**

The majority of the teachers indicated that creativity is important to meet challenges

and solve day-to-day problems (20.3%), to develop independent thinking (18.8%) and to bring out hidden talents (17.4%). 13% of the teachers said it was important for the development of knowledge, 11.6% that it leads to self-expression. Responses which indicated that it leads to original idea generation, discoveries, inventions and innovations, to avoid passive teaching learning processes and for advancement in all fields were 7.2% each.

Table-9.9: Distribution of teachers' responses on the importance of creativity and reasons for developing creativity among the students

Development of creative thinking is	f	% of cases	X^2 (Chi-square)
Extremely important	28	31.8	
Very important	50	56.8	64.36$
Moderately important	8	9.1	
Not very important	2	2.3	
Not at all important	0	0.0	
Reasons for giving importance to developing creativity among secondary school students	f	% of cases	
1. Educational value			
1.1 To develop independent thinking	13	18.8	
1.2 To bring out the hidden talents of the students	12	17.4	
1.3 To avoid passive teaching-learning process	5	7.2	
1.4 For academic excellence	4	5.8	
1.5 To develop scientific attitudes among the students	3	4.3	
2. Future – problem solving use			
2.1 To meet challenges and solve day to day problems	14	20.3	
2.2 To think about and compare life situations	4	5.8	
2.3 Promotes liveliness and harmony	2	2.9	
3. Advancement in knowledge			
3.1 For the development of knowledge	9	13.0	
3.2 For advancement in all fields (technical, economic, political, & cultural.)	5	7.2	
4. Leads to bringing something into existence			
4.1 Creativity leads to self-expression	8	11.6	
4.2 Creativity leads to original idea generation	5	7.2	
4.3 Creativity leads to discoveries/inventions/innovations	5	7.2	
4.4 Creativity leads to experimentation	3	4.3	
4.5 Creativity leads to imagination	3	4.3	
4.6 Creativity leads to curiosity	2	2.9	
	97*		

$= Significant at 0.001; *: Multiple responses (69 valid cases)

Some selective teachers views' found in the Teachers Questionnaire are also quoted here as examples.

The aim of education is not creating robots, but humans with flesh & blood, who can think on their own. It solves the problems facing present societies to a greater extent.

(English teacher, female, aged 51-55 yrs. and exp. 31 and above)

Creativity is very important among the school children. They are the future builders of the nation.

(Telugu teacher, female, aged 46-50 yrs, exp. 26-30)

In this present world of science and technology, it is very important to make the students highly competitive.

(English and social studies teacher, male, aged 41-45 Yrs. and exp. 11-15)

9.2.10 Methods of encouraging creativity in the classroom used by teachers

The interviews indicated that almost all of the teachers wish to encourage creativity among their students. They were also asked to give reasons why they would like to encourage the children to be creative.

A Telugu teacher (T FT1) emphasised the encouragement of creativity because it was useful in future life to learn a vocation and assist in employment. An English teacher (E MT2) thought that it was useful *'not only in their academic work but also in their life to achieve higher goals'*. Similar views were expressed by the Biological science teacher (BS FT8), *"I encourage them to achieve a certain goals of life"*.

A teacher of social studies (SS FT10) said, *'I encourage them to progress in all-round development and they will become good citizens in future life'*. A female teacher of mathematics (M FT5) said that she encouraged them *'by providing them some chance to come out with their opinions'*.

A male teacher, teaching PS (PS MT7) said, *"Sure, I like to encourage. Development of creativity is compulsory. Teaching for children to think in four different ways is better than a rote memory learning method"*. Another PS and mathematics teacher (PS+M MT6) suggested that:

"This is the right age for students and right time for us to develop creativity among the students. Each individual is a unique person and he has some unique ideas in his mind. If we try to nurture this need it may be that individual will turn out to be a great help to society. It is the teachers' responsibility to develop creativity among the children when they are young".

The English and BS teacher (E+BS MT3) realised the necessity of encouragement and he said:

> *Yes. Because I know what are the consequences or the results and benefits that we get from creativity. Through creativity we see whatever innovations today we see. In this world they may be all due to the product of creativity. So we should see that the students can come out with a new idea or novel response or some originality in their answers. I do encourage them because this may be the right place for them to develop.*

Further he explained how he behaved in the classroom with them:

> *Definitely, I encourage children. Because I know creativity should be nurtured and it should be promoted. Sometimes I have tried to clarify doubts, sometimes I have said, 'your question is very good', and also I have tried to give reinforcement. I try to maintain a conducive atmosphere in the class and also encourage asking such questions in the future too.*

A mathematics teacher (M MT4) stressed the role of the teacher in encouraging the children. He said:

> *Education is the all round development of a child. Creativity is one of the factors of the*

all round development of the child. Some innate capacity is there in the person and if you are not discovering it... It is the teacher who should discover it, there is no other person to do so. At home parents are not trained enough to do that. So it's the work of the teacher to discover creativity and take it forward in a proper way.

If you discourage a creative child he will become a problematic child in your class. He will create problems in your class. He will put challenges you. You have to some times cut a sorry figure in front of the class. I'm telling you the negative aspect of that. Suppose you do not take into account his creative ability. If you try to suppress it, you are found to be a weak person.

If he is asking a question, if you are not able to answer it, and if you want to control that boy in a negative way, then he will understand, what is your aim? What is your idea? and he will be problematic, not only problematic to the teacher but his complete behaviour will change and it is not to his good. It will be a disadvantage and a negative factor in his life. It is possible that he will become a permanently disobedient child.

Only one social studies teacher (SS MT9) said, *"I couldn't encourage creative thinking among the students because we don't have time for that in the class".*

The questionnaire data in Table-9.10 show that the teachers are positive in encouraging the children in their classrooms and they would like the children to be creative

Table-9.10: Methods of encouraging creativity in the classroom

Q. Would teachers like to encourage their pupils to be creative?	**Yes**	84 (96.6)
	No	3 (3.4)
	X^2	74.74$^{\$}$
Q. How teachers would encourage creativity	f	% cases
1. Encourage pupils to find novel solutions/answers to a given problem	22	30.1
2. Giving freedom to respond to and express ideas	14	19.2
3. Asking students to prepare improvised apparatus/models	13	17.8
4. Asking provocative questions	9	12.3
5. Giving titles/statements to relate to day-to-day situations	8	11.3
6. Encouraging experimentation	7	9.6
7. Conducting literary competitions	7	9.6
8. Giving examples of creative personalities	5	6.8
9. Creating/encouraging students' interests and zeal towards different fields	5	6.8
10. Encouraging students to participate in open/group discussions	5	6.8
11. Encouraging student presentations	5	6.8
12. Organising cultural activities	4	5.5
13. Building self confidence	4	5.5
14. Asking students to write a imaginative story	4	5.5
15. Adopting a heuristic approach	3	4.1
16. Creating a friendly environment	3	4.1
17. Encouraging curiosity	3	4.1
Total multiple responses for 'YES'	124*	
Why teachers would not like to encourage creativity	f	%
1. Because I teach only language and the skills of language.	1	1.15
2. There is not enough scope, the type of education does not give an opportunity for creativity in children.	1	1.15
3. Time constraints and no encouragement from the staff. Talent is not recognised.	1	1.15
Total responses for 'NO'	3	

* = Multiple responses (73 valid cases); $ = Significant at 0.0001 level

(96.6%). Only 3.4% would not like to encourage creativity. The X^2-value 74.74 indicates a significant trend of opinion at 0.0001 level. The teachers were asked to mention some of the methods they adopt in the classrooms to enable their children to be creative. These are presented in the same table.

The table shows that the teachers encourage their students to find novel solutions on answers to problems (30.1%), give freedom to respond to and express ideas freely (19.2%) and ask them to prepare improvised apparatus/models (17.8%). Asking provocative questions (12.3%), giving titles on statements to relate to day today situations (11.3%), encouraging experimentation, and conducting literary competitions scored 9.6% each. A very small percentage of teachers adopted heuristic approaches, created a friendly environment or encouraged curiosity. These totalled 4.1% each. Three teachers did not encourage creativity. The reasons are presented in Table 9.10.

Some typical selected responses from the TQ are cited below:

By creating a conducive environment in the class. Encouraging pupils to ask questions and building self-confidence among the students.

(Physical science teacher, Male, aged 26-30;exp. 6-10.)

Exposing them to situations that bring out the creative talent of the children.

(Social Studies Teacher, Female; aged 41-45; exp.11-15)

By encouraging them to participate in various activities and involving them in open discussions, so that their views can be recognised.

(Physical science Teacher, Female; aged 26-30; exp.1-5)

9.2.11 How teachers can develop creative thinking

One hundred percent of the teachers expressed the views that a teacher can develop creativity among the students by adopting different techniques in the classroom.

Three teachers expressed similar views; a teacher of Telugu (T FT1) said, *"we can develop creative thinking in students from sports, cultural activities and literary competition"*; the biology teacher (BS FT8) said, *"by showing experiments, film strips, improvisation of apparatus"*; and the social studies teacher (SS FT10) said, *"by organising cultural activities, games, writing songs & singing competitions"*.

An English teacher (E MT2) said, *"First, teachers should identify the talent, they should polish the rough ends. Students exhibiting creative thinking should be constantly exposed to a variety of problems and teachers should instil confidence in the students to be creative in their thinking"*.

A PS and mathematics teacher (PS+M MT6) suggests how a teacher can develop creativity:

By asking many divergent questions. Apart from his teaching lesson he can spend some

five minutes in the classroom, which is extending the lesson to 45 minutes, presenting the children with some unreal situation and asking what would be the result. The teacher should spend some five minutes separately before starting class, which will be motivating where students feel free to take part in the discussions.

The teacher of English and BS (E+BS MT3) discussed how the teacher can stimulate the students:

This is a very important question. Teachers should be given a special orientation for this. They should adopt innovative methodology. They should adopt methods of teaching in such a way that creativity is focused on the children. Some unstructured stimuli should be presented for them, so that they just keep on thinking to structure them where the creativity comes out. So we should try and see always with some stimulus questions that they should come out with open-mindedness. The response should be very spontaneous and we shouldn't ask such a question and tell them that we are going to evaluate them. So these responses are not evaluated. Then I think creativity will emerge. For this teachers need special training.

A PS teacher (PS MT7) suggested some measures for teachers.

If the teachers are not able to develop creativity in their usual classroom teaching they can form clubs like Science clubs, Maths clubs, Literary competitions, clubs etc., and spend some time (one or two hours) with children after school hours. In this way we can develop their thinking abilities, curiosity and interest.

The other way is to start a discussion with the teacher and invite questions from the students. Sometimes the teacher can ask the students to come with preparation on one topic and give a presentation to the class. The teacher begins discussion in the class first and asks the students to contribute and participate one by one in the discussions. In some sessions students ask questions instead of the teacher.

9.2.12 Factors which assist in developing creative thinking among the students

In the Teachers' Questionnaire (TQ), some of the possible factors which may assist in developing creativity among the students were presented to the teachers. They were requested to mark their level of agreement on a Likert-type 5 point scale for each statement with a tick (✓) in the appropriate column. The five-point scale was anchored as follows:

5 = Extremely Important (E-Imp)
4 = Very Important (V-Imp)
3 = Moderately Important (M-Imp)
2 = Not Very Important (N-Imp)
1 = Not At all Important (NA-Imp)

Table 9.11 presents the teachers' agreements (various levels with percentages) with each factor in assisting creativity development among the students and overall means, SDs and X^2 –values. The larger the X^2-values for each statement the greater the probability of a real divergence of experimentally observed from expected results. Mean values above 3 were regarded as to mean "in agreement with the statement" and mean values below 3 were regarded to mean "disagreement with the statement".

For the purpose of analysis of the responses, "Strongly agree" and "Agree" responses were combined as a measure of **Agreement** and a similar combination was made to asses **Disagreement**. The remaining response (Undecided) on the scale indicated no

opinion (eg. Treffinger, et al , 1968; Fryer, 1989 & 1996).

Almost all teachers agreed that "building self-confidence" (96.5%)*, will assist in developing creativity. Other factors, " a creative teacher (94.3%)" "good teacher-pupil relationships (95.4%)" and "encouraging experimentation (87.2%)" were considered important in developing creative thinking. Only 36.7% of teachers agreed (the same percentage 36.7% disagreed) that "informal teaching" will assist in development of creativity (the scale mean is also <3). All fifteen X^2-values are significant at 0.001 level. This indicates that the trend of the teachers' opinion is significant for all the fifteen factors

Table –9.11: Teachers' agreement with factors' assist to creativity development among the students

Factors	Level of agreement: Very High %	High %	Medium %	Low %	Very Low %	Mean	SD	X2 (Chi- square)
1.Building self-confidence among the students	46.0	50.5	2.3	1.0	0.0	4.41	.60	75.81$
2. A creative teacher	48.3	46.0	4.6	1.1	0.0	4.41	.64	68.45$
3. Good teacher pupil relationships	46.0	49.4	2.3	1.1	1.1	4.38	.70	111.56$
4. Encouraging experimentation	43.0	44.2	10.5	1.2	1.2	4.27	.79	82.37$
5. Developing curiosity	35.6	56.3	6.9	1.1	0.0	4.26	.64	69.28$
6. Treating students imaginative ideas with respect	37.5	51.1	9.1	2.3	0.0	4.24	.71	56.64$
7. Supportive home environment	37.9	47.1	14.9	0.0	0.0	4.23	.69	14.35$
8. Encourage pupils to ask questions	32.6	52.3	14.0	1.2	0.0	4.16	.70	51.40$
9. Treating students questions with respect	32.2	54.0	11.5	2.3	0.0	4.16	.71	55.39$
10. Setting interesting tasks	33.3	41.4	21.8	2.3	1.1	4.03	.87	56.85$
11. Teaching self-initiation to the students	23.3	54.7	14.0	8.1	0.0	3.93	.84	44.33$
12. Teachers asking provocative questions	27.1	49.4	9.4	11.8	2.4	3.87	1.02	59.77$
13. Providing exciting and adventurous school atmosphere	33.7	36.0	17.4	7.0	5.8	3.85	1.14	35.40$
14. Teaching self-evaluation to the students	15.3	56.5	21.2	5.9	1.2	3.79	.82	81.06$
15. Teachers asking open- ended questions	21.2	42.4	27.1	8.2	1.2	3.74	.93	44.35$
16. Informal teaching	8.9	27.8	26.6	17.7	19.0	2.90	1.26	9.29#

$= Significant at 0.001 #= Not significant at 0.05

except the informal teaching factor (X^2=9.29#).

9.2.13 Obstacles in developing creative thinking among secondary school children.

The teachers were asked in the interview to identify the major obstacles to developing creativity that they experienced in the schools at various levels i.e., school, teacher and student. The same question was also asked in the Teachers Questionnaire (TQ). In the TQ, a list of some possible obstacles to creativity development among the students at school level, student level and teacher level was presented to the teachers. They were asked to indicate on the given 5-point scale their agreement with each statement (See App.-H, Q.Nos.7, 8 and 9). The responses given by the teachers are presented in tables 9.12, 9.13

* Note: All the percentages within the brackets including the Very high and high percentages.

and 9.14.

9.2.13.1 Obstacles at School level

A Telugu teacher stated that the *'School environment is not good'*. The teacher teaching social studies (SS FT10) said there are *'inadequate resources at school'*. The PS teacher (PS MT7) mentioned a similar problem of resources:

> *In my opinion the main obstacle in government schools is lack of resources at school. Lack of time is also one of the obstacles. This school is a shift school. It runs from 12.30 PM to 5.00 PM. Moreover, children come from different parts of the city, so after the school they have to run to catch the city buses, which are overcrowded and some times they need to stand on foot board or swing on the door handles.*
>
> *If we try to collect some donations for developmental activities then there are so many criticisms and allegations. So nobody takes an interest or initiates it. Even if anybody is willing to take an interest to do some thing then s/he will get no encouragement or co-operation. There are many extraneous factors, which discourage us.*

Two other teachers (E MT2 and SS MT9) perceived that *'a time-bound syllabus is a major obstacle'*. A female mathematics teacher (M FT5) said, *"the syllabus is very vast. Because of the syllabus teachers are in a hurry to complete the syllabus. I don't think teachers have that much time to use different methods to solve the problems"*.

Some obstacles experienced by the biological sciences teacher mentioned were Short periods, lack of laboratory facilities for science subjects and a shortage of budget.

The teacher of English and BS (E+BS MT3) blamed the administration and government policies:

> *At school level, the administration, that is the headteacher, who is the head of the institution should first of all understand what is creativity. He should acquaint himself with the techniques of creativity. He himself should know whether creativity is a process or a product. Then, we can achieve good results. The top people, those sitting at the higher levels, if they provide an opportunity or freedom for teachers then teachers can express themselves freely and openly; if they perceive things in the right spirit the same can be inculcated in the students. Government policies are one of the reasons for keeping down creativity at school level. For example, pressurising the teachers for completion of the syllabus and other work[3] which detracts from teaching, etc.,*

Further he said that freedom for teachers and students in the classroom is required:

> *If the head of the institution permits, if he gives us freedom in the classroom then at least sometimes we come out of teaching subject matter and try to include some psychological factors in teaching (e.g. intelligence, creativity, personality etc.,). For that I believe that " knowledge about creativity should also given to the head of the institution because until he understands he can not give freedom to the teachers.*

A Mathematics teacher (MMT4) said,

> *'At school level means the school administration. Society is running the school, the government or other people. They must provide all such infrastructure in the school. Of course, this infrastructure may not be required in full but definitely it is required to a certain extent.*

In the Teacher Questionnaire the most often cited constraints at school level were

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3 Enumeration, Frequent election duties, etc.,

inadequate resources (80.5%)*, instructional materials (85.1%) and conflicts with curriculum demands (76.3%). They also strongly agreed that unsuitable accommodation (75%) and inadequate funds (72.3%) created problems. Only 53.5% of teachers said their head- teachers were not supportive (see table-9.12).

Table–9.12: Obstacles to creativity development at school level

School level	Very High %	High %	Unsure %	Low %	Very Low %	Mean	SD	X2 (Chi-square)
1. Inadequate resources at school	36.8	43.7	9.2	9.2	1.1	4.06	.97	62.25$
2. Inadequate instructional material	29.9	55.2	4.6	10.3	0.0	4.05	.88	54.47$
3. Conflicting curriculum demands	33.8	42.5	12.5	11.3	0.0	3.99	.96	23.30$
4. Inadequate funds	28.9	43.4	7.2	19.3	1.2	3.80	1.10	43.42$
5. Unsuitable accommodation	23.9	51.1	4.5	19.3	1.1	3.77	1.06	69.50$
6. Inadequate support from the parents	30.7	38.6	11.4	14.8	4.5	3.76	1.17	35.30$
7. Over-large classes	27.9	41.9	4.7	19.8	5.8	3.66	1.24	42.02$
8. Inadequate freedom for teachers to pursue creative activities	28.7	37.9	8.0	16.1	9.2	3.61	1.31	29.26$
9. Inadequate support from society	19.5	41.4	17.2	19.5	2.3	3.56	1.09	33.86$
10. Inadequate freedom for students to pursue creative activities	27.1	36.5	5.9	22.4	8.2	3.52	1.32	28.24$
11. Inadequate support from the Head teacher	14.0	39.5	12.8	23.3	10.5	3.23	1.25	24.58$
12 Other responses								
1. Due to examination orientation (N=1)	100.0	0.0	0.0	0.0	0.0	5.0	0.0	-
2. The system of evaluation (N=1)	100.0	0.0	0.0	0.0	0.0	5.0	0.0	-

$= Significant at 0.001

9.2.13.2 Obstacles at student level

At student level, a female teacher, teaching social studies (SS FT10) reported as an obstacle *'unequal aptitudes among the students'*. A mathematics (M FT5) teacher complained that *"at student level, the present situation in our school is that most of the students come from very poor backgrounds, financially. In addition some of them have only single parents who are employees and they are illiterate; facilities at home are nil. So their emotions are totally disturbed. They come here because their parents send them. Even if we try to give some innovative ideas and to develop creativity they are not in a position to respond"*.

In a similar way a biological sciences teacher (BS FT8) said that "*children belong to illiterate families and many are undernourished children coming from low status families"*.

The obstacles quoted in the Teachers Questionnaire (TQ) (table-10.13) suggests that students' lack of experience (76.1%)*, passive participation in the classrooms (72.7%), a tendency to rote learning (71.8%), unmotivated students (70.9%), and poorly performing students (70.5%) are obstacles. Only 55.2% of the teachers said that students have too

* Note: All the percentages within the brackets including the Very high and high percentages

much homework. Some of the obstacles mentioned by the teachers under "other" are also presented in the table.

Table-9.13: Obstacles to creativity development at student level

Students level	Very High %	High %	Unsure %	Low %	Very Low %	Mean	SD	X2 Chi-square
1. Students are not well motivated	26.7	44.2	8.1	19.8	1.2	3.76	1.10	48.42$
2. Students participate passively	21.6	51.1	12.5	9.1	5.7	3.74	1.08	59.50$
3. Students tend to rote learn	35.3	36.5	4.7	10.6	12.9	3.71	1.39	37.29$
4. Students lack of experience	13.6	62.5	4.5	15.9	3.4	3.67	1.01	104.61$
5. Students perform poorly	12.5	58.0	4.5	20.5	4.5	3.53	1.09	86.89$
6. Students lack confidence	19.3	47.7	5.7	19.3	8.0	3.51	1.23	49.27$
7. Students have too much home-work	20.7	34.5	4.6	33.3	6.9	3.29	1.31	34.67$
8. Other responses								
1. Lack of creative	100.0	0.0	0.0	0.0	0.0	5.0	0.00	-
atmosphere(N=1)	100.0	0.0	0.0	0.0	0.0	5.0	0.00	-
2. Over-emphasis on academic excellence (N=1)	100.0	0.0	0.0	0.0	0.0	5.0	0.00	-
3. Poor family back ground (N=1)	100.0	0.0	0.0	0.0	0.0	5.0	0.00	-
4. No parental care/ encouragement (N=2)								

$= Significant at 0.001 level

9.2.13.3 Obstacles at teachers' level

At the teachers' level the obstacles presented included the stress on completion of the syllabus and examination performance, heavy work loads and a lack of recognition of their work. For instance, a PS Teacher (PS MT7) said that "*In the present situation a teacher's hands are tied tightly. He is unable to develop creativity. The main reasons are not enough time and a vast syllabus*".

A female mathematics teacher (M FT5) expressed a similar view. *In the present-day classroom teachers have a heavy workload and must finish the syllabus etc. The teacher feels that he has to complete his duties first, sidelining the students' interest. Most of the time teachers engage in the lecture method and often the child is a silent spectator.*

The teacher of English and BS (E+BS MT3) pointed out that *'At teacher level, teachers may not have adequate knowledge of creativity. Teachers should be properly trained. The teachers should see that new methods of teaching are deployed in the classroom and must encourage students. They should accept whatever answer students give with an open mind. The teachers should not insult the student whenever divergent responses occur on some particular issues.*

A mathematics teacher (M MT4) said, "*the key person here is the teacher. If the teacher is not willing to give importance to creativity thinking, no body can help. I don't blame the student that much here because he doesn't know. He doesn't know that he has got*

* Note: All the percentages within the brackets including the Very high and high percentages

that ability unless and until it is nurtured".

When the researcher drew attention to teachers' complaints against the vast syllabus and time pressure he said

Of course, the syllabus is there. I'm also dealing with such subjects, where the maximum syllabus is there maths, English, and sciences. Creative thinking does not require extra time as such. You can ask one or two questions in the class itself. For this, as I said, training is required. The teacher should get himself acquainted with what this is (creativity). When the teachers complain that the syllabus is too much and there is no time to do it, it is not true. It means that those teachers do not really know what creative thinking is Otherwise they would not pose this question.

I think that creative thinking can be developed during teaching. It does not require separate time or separate energy. Of course, technique is required. A technique for the teachers is required. Only a few children will be creative. We can develop them. We can do that after the period also. Like in mathematics, children may have the skill of solving riddles, doing mathematics puzzles and all those things. You do it in the class. You identify children, make a small group or organise a club and ask them to participate, stay after school hours, half an hour or so. And give them some work. That way they can get recognition and they can take more and more interest in such things.

Table 9.14 exhibits the perceived teacher-level obstacles in developing creativity among the students. According to the data, they perceive that they are under stress in completing the syllabus (86.2%). They emphasise preparing students for examinations

Table-9.14: Obstacles to creativity development at Teacher level

Teacher level	Very High %	High %	Unsure %	Low %	Very Low %	Mean	SD	X2 (Chi-square)
1. Teachers' stress on completing the syllabus	40.2	46.0	2.3	5.7	5.7	4.09	1.09	78.50$
2. Teachers' over emphasis on preparing students for examinations	31.0	56.3	0.0	8.0	4.6	4.01	1.03	59.90$
3. Heavy teaching work-load	29.9	46.0	5.7	16.1	2.3	3.85	1.10	56.74$
4. Lack of recognition of teachers' creative work	26.7	44.2	9.3	14.0	5.8	3.72	1.18	42.26$
5. Lack of recognition of teachers' work in promoting students' creativity	18.8	52.9	9.4	14.1	4.7	3.67	1.08	62.35$
6. Inadequate preparation time for teachers	12.5	54.5	5.7	23.9	3.4	3.49	1.09	76.77$
7. Lack of knowledge about creativity among teachers	20.5	39.8	3.4	21.6	14.8	3.30	1.40	30.64$
8. Lack of understanding about creativity among teachers	13.6	44.3	5.7	27.3	9.1	3.26	1.26	44.39$
9. Lack of experience among teachers	4.9	34.6	9.9	37.0	13.6	2.80	1.20	35.36$
10. Lack of confidence among teachers	2.3	32.6	9.3	40.7	15.1	2.66	1.15	44.58$
11. Other responses	100.0	0.0	0.0	0.0	0.0	5.00	0.00	-
1.Lack of self-evaluation of the teachers(N=1)	100.0	0.0	0.0	0.0	0.0	5.00	0.00	-
2.Lack of training programmes(N=1)								

(87.3%) and a heavy teaching workload (75.9%), a lack of recognition of teachers' work in promoting students' creativity (71.7%) and a lack of recognition of teachers' creative work (70.9%) as the major obstacles for teachers in promoting creativity in the formal school system.

Only 39.5% of the teachers agreed that teachers have a lack of experience or lack of understanding about creativity (57.9%) but 34.9% said that teachers are lacking confidence.

9.2.14 Teachers' attitude towards the encouragement of creative thinking among the students.

Table 10.15 reports the teachers' attitudes towards the encouragement of students' creativity development in relation to the teachers' sex, age, experience and educational qualifications.

The teachers were asked to indicate their level of agreement with 16 statements regarding the encouragement of creativity. All the positive statements were awarded 5, 4, 3, 2, and 1 scores; negative statements were awarded 1, 2, 3, 4, and 5 scores. The maximum score is 80 (16x5) the minimum 16 (16x1). Addition of all 16-item scores gives the individual teacher's score. Means, SDs, and F-ratios/t-values were calculated for the purpose of analysis.

Based on the t-value (0.07)(see table-9.15), there were no statistically significant differences between male and female attitudes, although the female mean score (63.37) is marginally higher than the male (63.24). In the case of age and experience, no significant differences were found, although the lower age groups and less experienced teachers' mean scores were higher than their counter parts.

Table–9.15: Mean scores, SDs, and F-ratio (or t-values) of creativity encouragement Scores of the teachers in relation to sex, age, experience, and qualification

Variable	Category	N	Mean	SD	SEm	F-ratio / t-Value
Sex	1. Male	25	63.24	8.25	1.65	
	2. Female	63	63.37	7.80	0.98	t= 0.07#
Age	1. < 10 Yrs	14	66.36	6.81	1.82	
	2. 31- 40 Yrs	17	65.18	9.30	2.25	F= 1.55#
	3. 41- 50 Yrs	42	62.12	8.54	1.32	
	4. 51- 60 Yrs	15	61.80	3.23	0.84	
Experience	1. < 10 Yrs	24	65.92	8.34	1.70	
	2. 11-20 Yrs	26	63.85	6.79	1.33	
	3. 21-30 Yrs	26	60.27	8.71	1.70	F= 2.31#
	4. 31-40 Yrs	12	63.67	5.58	1.61	
Qualification Professional	Graduates	72	63.33	7.90	0.93	
	Postgraduates	16	63.31	8.06	2.01	t= 0.01#
Qualifications Academic	Graduates	51	62.39	8.06	1.70	
	Postgraduates	37	64.62	7.55	1.68	t=1.32#

= Not significant

9.2.15 Teachers' attitude towards the present examination system in Andhra Pradesh.

In the interviews, the teachers were asked about the role of examinations in developing creative thinking among students. All teachers (100%) were unhappy with the present examination system.

For instance a male English Teacher (E MT2) said that '*examinations are bookish. There is no room for creativity'*. A PS and Mathematics teacher (PS+M MT6) said, '*they do not give any scope for create thinking because they encourages convergent thinking'*.

Three teachers (T FT1, SS MT9 and SS FT10) argued that the examination pattern should be modified to develop a view of the development of creative thinking; and another teacher of biological sciences (BS FT8) said, *' examinations should give scope for the students to express their ideas'*.

An English and BS teacher (E+BS MT3) was unhappy with the examination system and said,

'In the examination pattern, sometimes creativity is not shown. They may be asked straightforward questions. Usually students will mug up the question and answers; simply they reproduce. So their creativity is not evaluated. I think, the present examination system does not take much account of creativity. They should be given questions in a very open-ended way and allow students to express their own opinions. So the present system, I think, needs some modification to promote creativity'.

Similar criticism was also made by the PS teacher (PS MT7):

> *We can't asses even 0.01 percent of creativity of a child through our present examination pattern. The questions asked in the examinations are rote-memory based. They never consider giving questions to develop creative thinking. I observed some instances where teachers strike-off the answers without kindness, if a student writes answers in a creative way. If the teacher has some knowledge of creativity then he will appreciate the various types of answers. If the answer script goes to the teacher who doesn't know about creativity, the creative students will be definitely victimised. So while we sometimes encourage and appreciate students who do these things in the classroom, we discourage them from writing in the examinations, because we don't know who is going to mark their papers and we don't know about the examiner's way of thinking or mood. So we are sometimes enthusiastic to develop creativity among the students but the examination system works to suppress creativity.*

A mathematics (M MT4) teacher was also not happy with the present examination system:

> *Of course, I agree that the present curriculum is framed in such a way that our present system of evaluation must be blamed. What students learn throughout the year, they have to just vomit it out in just two and half-hours. In foreign countries this is not the method. They take the whole performance of the child through out the year and they give grades and then in the end they will form the result. I think that is the best technique.*
>
> *As far as creativity is concerned, we can accommodate creative thinking in every class and in every subject, every time. How to test creativity? How can we include this in the exams or separate testing that is to be done? I don't think it can be recommended, because this factor is not common in all students. I may be wrong also, because I do not have much knowledge about how to examine creativity. How to test it after they have acquired it? How to put them to test? As far as the examination system in our state is concerned it is full of loopholes. Much can be done, provided teachers co-operate, because the teachers are the main people. If they take an interest, wonders can be done. If they do not take an interest, things may remain the same.*

9.2.16 Teachers' attitude towards the present curriculum in Andhra Pradesh.

Generally the teachers viewed the curriculum is overloaded. For instance, two teachers (EMT2 & SS MT9) said that the present curriculum was unhelpful in developing creative thinking. A PS and mathematics teacher (PS+M MT6) said that *'the present curriculum is examination oriented'*. While *"the curriculum needs to be changed to develop creative thinking"* was the view of a social studies teacher (SS FT10). The Telugu teacher (T FT1) reported, *"the lessons should be given more scope for thinking'*. A similar view expressed by a BS teacher (BS FT8): *'the present curriculum is not up to the required standard, as it does not provide subjects like art, music, craft and manual training. Extra lessons are required for all these activities".*

A physical science teacher (PS MT7) complained that the

> *present curriculum is not useful in any way. The syllabus is very vast. This vast syllabus aims to teach subject content, and the development of creativity and related activities are given least importance. The preparation of a text should be attractive to a child, after reading the book the child must be stimulated. Suppose a child reads one principle and its applications then he must start thinking, can I prepare any thing based on this principle? How can I apply this principle for other occasions? It is better to develop this type of thinking among the children. But the present textbooks are not like that. They always concentrate on questions and answers. The questions asked after each lesson are also not helpful in developing thinking.*

A female mathematics teacher (M FT5) also indicated that

> *The present curriculum in science is ok. It develops the reasoning ability of the child and new ways of thinking for the child. But in mathematics I don't think it is suitable for developing creative thinking. Mostly the child has to reproduce only the formulas and apply the formulas to solve the problems and is not given any scope to apply new knowledge or new ways of thinking to solve problems. So the mathematics curriculum has to be changed, because it only uses formulas in most of the syllabus.*

A male mathematics teacher (M MT4) commented that *'of course, the present curriculum has given recognition to creative thinking but not to the desired extent'.*

A male teacher of English and BS (E+BS MT3) was very optimistic about the present curriculum. He said, *'From the curriculum point of view, I don't think that there is much required for creativity, because curriculum planners and designers who have designed the curriculum must have kept creativity in view. The only thing is, we should dig it out. We should see how it could be made creative. To make things creative a teacher should be creative. A creative teacher makes things creative. So maybe the curriculum does not require much change.*

The Teachers' Questionnaire data (table-9.16) show the teachers' opinions on the present curriculum at secondary level. they provide evidence of strong agreement with all the statements. Almost all teachers (84.9%) agreed that the curriculum is overloaded in all or most of the subjects. 74.7% teachers agreed that it was inflexible, 67.9% of them agreed

that no scope was given to students' self-evaluation and self-initiated learning. Many also agreed that no emphasis is given for creative activities in the curriculum (64.7%) and that the teaching methods are not appropriate (61.7%).

46.5% of teachers agreed that the curriculum is suitable and caters for the needs of wide range of learners and their learning environment. 39.3% of teachers disagreed with this statement, 14.3% of teachers were unsure about it.

Table –9.16: Teachers' attitude towards the present curriculum in Andhra Pradesh (India)

Present curriculum at secondary level	Very High %	High %	Unsure %	Low %	Very Low %	Mean	SD	X2 (Chi-square)
1. Emphasis is not given to creative activities	26.1	38.6	6.8	18.2	9.1	3.55	1.31	30.30$
2. Not flexible for students to pursue their creative activities	13.8	60.9	6.9	12.6	5.7	3.64	1.06	93.17$
3. Not enough scope for students' self-evaluation and self-initiated learning	17.9	50.0	8.3	22.6	1.2	3.61	1.06	58.86$
4. Overloaded in all or most of the subjects	22.1	62.8	3.5	8.1	3.5	3.92	0.95	108.42$
5. Suitable and caters for the needs of wide range of learners and their learning environment	3.6	42.9	14.3	36.9	2.4	3.08	1.02	59.69$
6. Teaching methods are not appropriate to learn creatively.	14.0	47.7	4.7	29.1	4.7	3.37	1.18	58.30$

$ Significant at 0.001 (df=1)

The teachers were asked to rank from 1 to 5 the emphasis of the present curriculum. The ranks were converted into the scores by following the procedure explained in chapter VIII. The scores for each multiple response were added, and mean scores and SDs were calculated.

Table 9.17 reveals that the teachers strongly expressed a view that the present curriculum gives great emphasis to knowledge (mean 72.46), more than other aspects. With the mean score 56.05 understanding stood in second place. Least importance was perceived to be given to application, skills and attitudes.

Table – 9.17: Mean scores and SDs of the teachers' opinion on curriculum emphasis in Andhra Pradesh

Curriculum emphasis is on	Mean scores	SD
1. Knowledge	72.46	7.65
2. Understanding	56.05	10.27
3. Application	44.81	12.03
4. Skills	44.26	9.63
5. Attitudes	30.39	11.72

Table 9.18 shows that 54.5% of teachers preferred that the curriculum should be activity-centred, 52.3% of them said it should be child-centred. Only 26.1% said it should be teacher-centred but learner-based. 9.1% of the teachers said the curriculum should be

teacher-centred or examination-centred, but only 1.1% said it should be examination-centred.

Table-9.18: The distribution of teachers' responses on promotion of creativity (N=88)

Promotion of creative thinking is possible if	f	% of cases
1. Activity-centred	48	54.5
2. Child-centred	46	52.3
3. Teacher-centred but learner-based	23	26.1
4. Teacher-centred	8	9.1
5. Examination-centred	1	1.1
	126*	

* Multiple responses (88 valid cases).
Note: Percentages were calculated on the basis of total valid cases but not on the total multiple responses

9.2.17 The suggestions made by the teachers for developing creativity

The teachers who were interviewed (N=10) were asked to give suggestions for the development of creative thinking among the students. Instead of presenting their ideas individually, their suggestions have been summarised in simple numerical values or frequencies. Their responses are presented in the table-9.19 in the form of frequencies.

Table-9.19: Suggestions made by the teachers for the development of creativity among the students

S.No.	**Suggestions given by the teachers**	f	% of teachers
1	Freedom of expression for the students	5	50
2	The syllabus must be flexible and according to the need of the students' present-day world.	3	30
3	Class size must be reduced	3	30
4	The syllabus must be reduced	2	20
5	No shift system of schooling	2	20
6	Asking students to do different types of things with material and manipulation of objects and ideas	2	20
7	Applying new creative techniques in the classroom. e.g. brainstorming	2	20
8	Academic freedom for the teachers	2	20
9	Reintroducing the deleted subjects like craft, material training, drawing and painting	1	10
10	A fixed percentage of the portion in the textbook should be allotted to a lesson.	1	10
11	Some marks should be allotted in all subjects	1	10
12	Rote learning should be discouraged	1	10
13	Providing congenial atmosphere in the class	1	10
14	Organising educational and science fares	1	10
15	Organising outings for children	1	10
16	Teaching self-evaluation	1	10
17	Encouraging group discussions	1	10
18	Insufficient time for the teachers	1	10
19	Teachers could use different teaching methods like discovery, problem - solving etc.	1	10
20	Teacher – student relations should be strengthen	1	10
21	Teacher should be open-minded and approachable to the students	1	10
22	Teachers themselves creative	1	10
	Total multiple responses	35*	

* = Total multiple responses (10 valid cases)
Note: Percentages were calculated on the basis of total valid cases but not on the total multiple responses.

Five teachers (50%) of the teachers suggested that "freedom of expression to the students' was important. Three teachers (30%) said, 'the syllabus must be flexible and according to the students present-day needs' and another three teachers (30%) said, "class size must be reduced".

Some suggestions were made by two teachers (20%), they were: (1) reduction of syllabus; (2) abolish the shift school system; (3) ask students to do different types of things with material and manipulation of objects and ideas; (4) apply new creative techniques, and (5) freedom for teachers. Some suggestions made by single teachers are also presented in the table 9.19.

A teacher of PS and mathematics said,

First of all, to develop creative thinking the teacher himself should be creative, and try to learn the methods of creativity. That means, how to develop creative thinking? Then he can put it in to practice. But for this the size of the class is not encouraging. The present size of the class is nearly 60, maybe it should be reduced to 30 to 35.

Further he suggests that the teacher should give incentive and reinforcement to the creative effort of the child and encourage the child to freely express his views. It can be planned or unplanned activity. The teacher can use the discovery method or problem-solving methods, provided class size is less and there are fewer restrictions by management.

A mathematics teacher (M MT4) suggested that "e*ducational psychologists, subject experts and teachers should work together and should design a portion of the text book, in order to improve creative thinking".*

9.3.0 Summary

This chapter has described the data from the interviews with teachers and the questionnaire. It indicates that teachers in government schools in India generally view creativity as something inspirational or imagination which is based on cognition. They claim to be able to recognise it in pupils, have varied views about its relationship to intelligence and believe that it can be developed in all school subjects. They believe that it is important for individual development and for society in the future and have a range of suggestions for its promotion with school. However they feel that obstacles include a lack of resources, materials, the curriculum and examination system, appropriate accommodation, too large class sizes and a general lack of freedom in teaching and of support for developing creativity. Pupils tend to be unmotivated, passive, lack experience and confidence and perform poorly; generally adopting rote learning. In addition they indicate that teachers require more training, particularly to develop practical creative ideas. The next chapter will explore the findings relating to students' creative thinking.

Chapter X

Data Analysis of the students' creative thinking

10.0 Introduction

The aims of this chapter are to explore the data on the children's creative thinking. The results of the verbal and non-verbal tests of creative thinking are presented in the following manner: conversion of raw scores to standard scores, followed by the frequency distribution of scores. Then the analysis of the both test scores will be discussed according to the aims and research questions posed. The results are presented under three broad categories: (i) students' background variables; (ii) organisational related variables and (iii) cognitive and motivational related variables.

10.1.0. Procedure for conversion raw scores into standardised scores

373 students' test scripts were scored as explained in chapter VI (6.3.4.2 and 6.3.5.2). As there are no right or wrong responses in the tests, each item was scored for originality, fluency and flexibility for verbal creativity, as well as originality and elaboration for non-verbal creativity. The means and standard deviations (SD) of raw scores of (a) components of verbal creativity and (b) components of non-verbal creativity were obtained, and are presented in the following table 10.1:

Table-10.1:The means and standard deviations of raw scores for verbal and non-verbal creativity components

Descriptive Statistics	Verbal Originality	Verbal Fluency	Verbal Flexibility	Non-verbal Originality	Non-verbal Elaboration
Mean	17.28	25.27	18.35	12.03	27.08
SD	15.08	10.71	7.44	6.65	9.27

The composite creativity scores are based on standard scores instead of raw scores. This is necessary because the standard deviation of the components of creativity raw scores sometimes markedly varies, and if raw scores are added up the ranking will be greatly affected (see Mehdi, 1973 and 1985).

The means and SDs were calculated for all the components of creativity and are presented in Table–10.1. They were used to convert different components of raw scores into standard scores (T-scores) by using the following formula:

$$T = 50 + 10Z \text{--------(F1)}$$

T = standard scores; $Z = [(X - M) / SD]$ X = raw scores;
M = Mean of the raw score; SD = standard deviation of the raw scores.

To obtain the overall or total verbal creativity score, its components, the verbal originality, verbal fluency and verbal flexibility raw scores, were independently converted into T-scores (standard scores) first and then added. Similarly, to obtain non-verbal creativity scores, its components, non-verbal originality and elaboration raw scores were independently converted into T-scores and then added (Wallach and Kogan, 1965, p.59; Mehdi, 1973 & 85, p.22). Finally, to obtain the composite scores as a creative thinking index score, the total verbal and total non-verbal scores were added.

10.2.0 The nature of the distribution of verbal and non-verbal creative thinking test scores

For the purpose of statistical analysis data were grouped. The standard scores of verbal originality, fluency, flexibility and total verbal creativity obtained for the 373 pupils of standard IX are presented in Table 10.2 in the form of frequency distribution and descriptive statistics. Similarly for the non-verbal and composite creativity scores, frequency distribution and descriptive statistics are presented in Table 10.3.

10.2.1 Frequency distribution of verbal test of creative thinking (VTCT) and its components (standardised scores)

The descriptive statistics for the verbal test of creative thinking (VTCT) are given in Table-10.2. The mean, median and mode of VTCT were 150.0, 147.0 and 90.3 respectively. The SD of the VTCT is 28.5. The maximum score obtained by the sample is 253.0 while the minimum score obtained is 90.3, giving a range of 162.7. To determine the .95 and .99 confidence interval limits of the population means, the Standard Error of Mean

Table-10.2: Frequency distribution and descriptive statistics of verbal creative thinking test (standardised scores)

SNo	Class-Interval	Verbal Originality (f)	Verbal Fluency (f)	Verbal Flexibility (f)	Class-Interval	Total Verbal creativity (f)	Cumulative frequency	Smoothed frequency	Descriptive Statistics	Verbal Originality	Verbal Fluency	Verbal Flexibility	Total Verbal creativity
1	20 - 29	0	9	12	90 - 109	19	19	28.3	Minimum	38.5	26.4	25.3	90.3
2	30 - 39	43	47	41	110 - 129	66	85	67.3	Maximum	100.2	77.8	75.1	253.0
3	40 - 49	182	136	142	130 - 149	117	202	89.0	Mean	50.0	50.0	50.0	150.0
4	50 - 59	95	110	115	150 - 169	84	286	83.3	Median	47.8	49.6	49.5	147.0
5	60 - 69	34	65	56	170 - 189	49	335	54.3	Mode	38.5	51.6	45.5	90.3
6	70 - 79	16	6	7	190 - 209	30	365	28.3	SD	10.0	10.0	10.0	28.5
7	80 - 89	1			210 - 229	6	371	12.3	SE_M	0.52	.52	0.5	1.5
8	90 - 99	1			230 - 249	1	372	2.7	Skewness	1.37	.00	-.03	.43
9	100 - 109	1			250 - 269	1	373	0.7	Kurtosis	2.41	- .22	-.18	.16
		373	373	373		373							

(SE_M) is found to be 1.5. So it may be said that the .95 and .99 confidence level limits[1] of the true values of this sample mean are 147.1 and 152.9; and 146.1 and 153.9 respectively.

The distribution of VTCT is positively skewed[2] (Υ_1=0.43). The kurtosis[3] (Υ_2) is 0.16, indicating that the distribution is more peaked than normal, which is called "Leptokurtic". The standard frequency polygon (see fig. no. 10.1) has been drawn for the data given in table 10.2.

10.2.2 Frequency distribution of scores on non-verbal test of creative thinking (NVTCT) and its components (standardised scores)

The frequency distributions and descriptive statistics for non-verbal originality, elaboration and total non-verbal creative thinking are presented in Table 10.3. The mean, median and mode of NVTCT were found to be 100.0, 98.6 and 97.5 respectively. The SD of the NVTCT was 16.6. The maximum score obtained by the sample in this test was 156.5, while the minimum score obtained was 52.7, giving a range of 103.8. In order to determine the 0.95 and 0.99 confidence interval limits of the population means, the SE_M was calculated. It was found to be 0.86. So it may be said that the 0.95 and 0.99 confidence interval limits of the true value of this sample mean are 98.31 and 101.69, and 97.78 and 102.22 respectively.

Table-10.3: Frequency distribution and descriptive statistics of non-verbal creative thinking test (standardised scores)

SNo	Class-Interval	Non-verbal Originality (f)	Non-verbal Elaboration (f)	Class-Interval	Total non-verbal creativity (f)	Cumulative frequency	Smoothed frequency	Descriptive Statistics	Non-verbal Originality	Non-verbal Elaboration	Total Non-verbal creativity
1	20 - 29	0	9	50 - 69	10	10	33.3	Minimum	31.9	20.8	52.7
2	30 - 39	61	44	70 - 89	90	100	91.7	Maximum	81.5	85.5	156.5
3	40 - 49	154	142	90 - 109	175	275	115.7	Mean	50.0	50.0	100.0
4	50 - 59	101	117	110 - 129	82	357	90.7	Median	48.5	49.9	98.6
5	60 - 69	41	49	130 - 149	15	372	32.7	Mode	43.9	53.2	97.5
6	70 - 79	13	10	150 - 169	1	373	5.3	SD	10.0	10.0	16.6
7	80 - 89	3	2					SE_M	0.52	0.52	.86
								Skewness	0.60	0.24	.22
								Kurtosis	0.28	0.30	.20
		373	373		373						

[1] Mean $\pm$ 1.96×SE_M = 150.0 $\pm$ 1.96 × 1.5 for 0.95 confidence level
Mean $\pm$ 2.58×SE_M = 150.0 $\pm$ 2.58 × 1.5 for 0.99 confidence level

[2] $\Upsilon_1 = \sum_{i=1}^{n} Z_i^3 / N$ where $Z_i = \sum_{i=1}^{n} (X_i - M)/S$; X= Test Score, M= Mean and SD= Standard Deviation

[3] $\Upsilon_2 = \sum_{i=1}^{n} Z_i^4 / N$ where $Z_i = \sum_{i=1}^{n} (X_i - X)/SD$; X= Test Score, M= Mean and SD= Standard Deviation

Fig-10.1: Original and smoothed frequency polygon of verbal creativity, based on data given in table-10.2

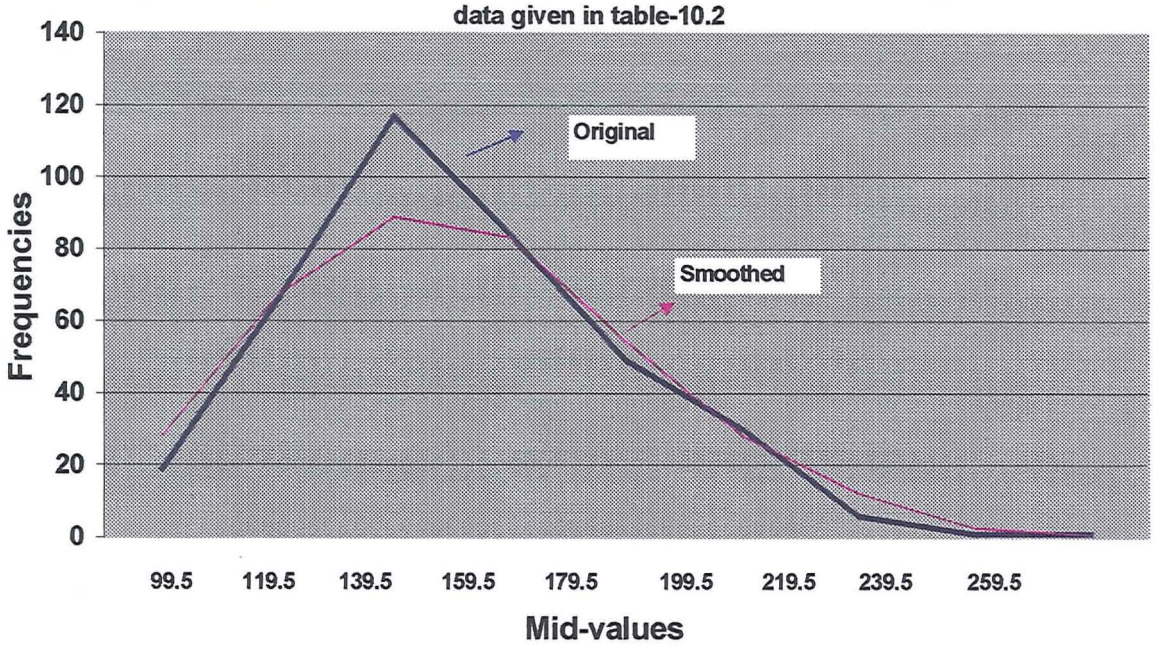


Fig.-10.2 Original and smoothed frequency polygon of non-verbal creativity, based on data given in table-10.3

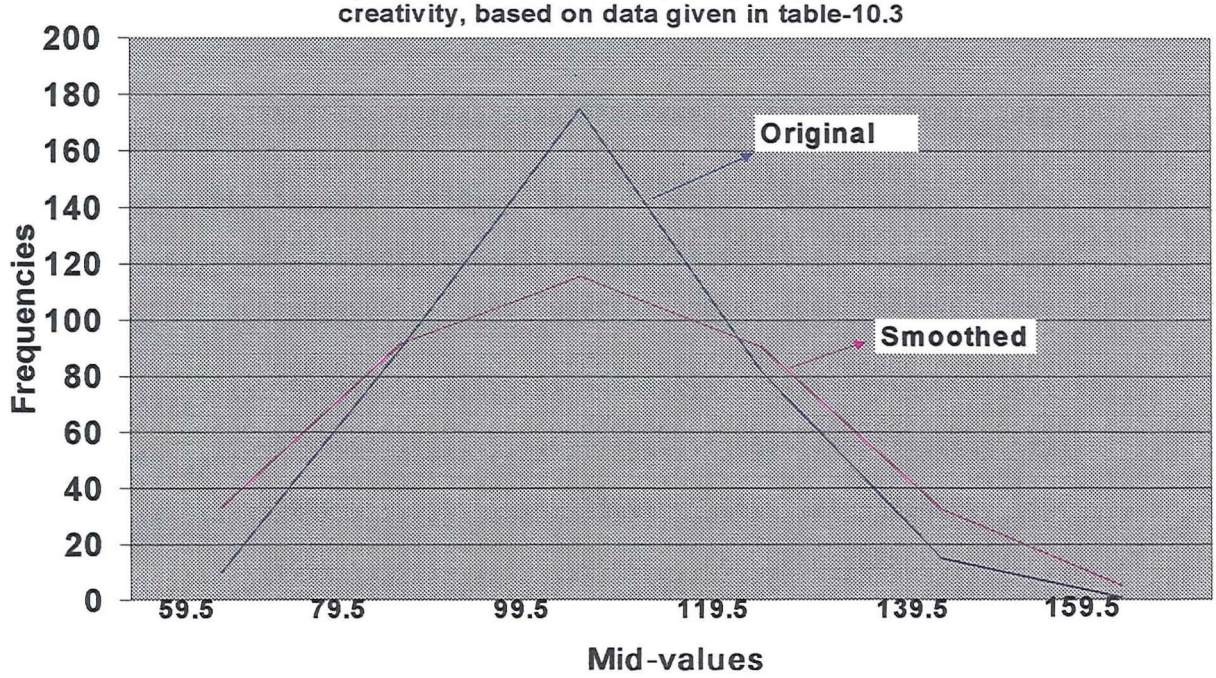
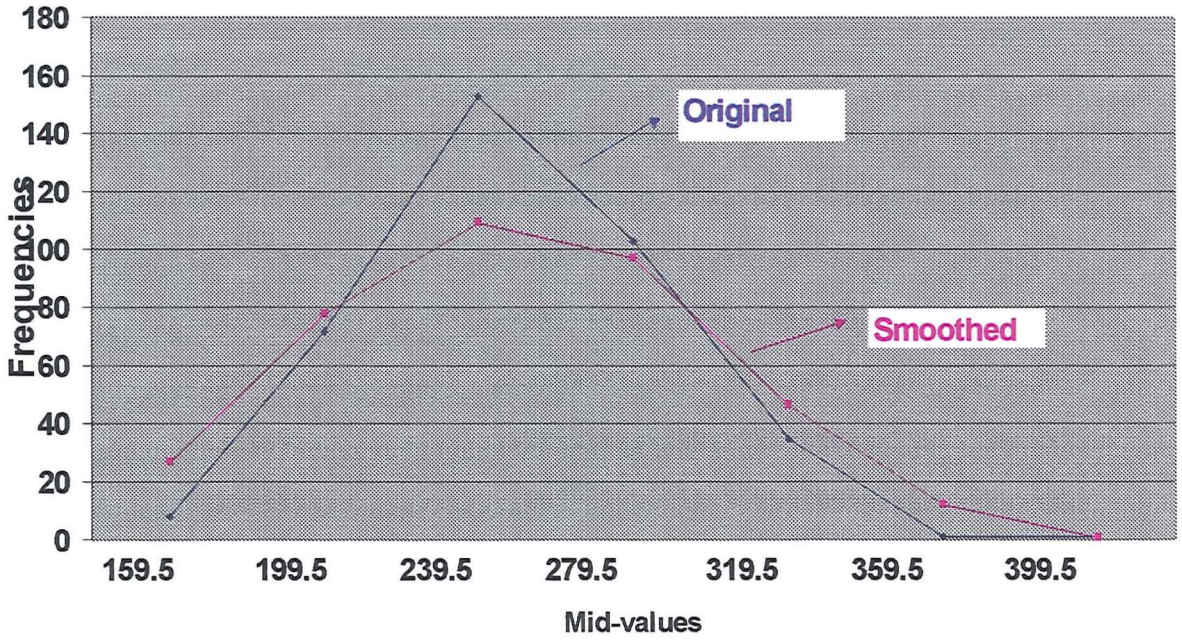


Fig.-10.3 Original and smoothed frequency polygon of composite creativity based on data given in table-10.4



The Skewness (Υ_1) of the distribution of the NVTCT scores has been found to be 0.22. This distribution is positively skewed. The Kurtosis (Υ_2) of the frequency distribution is found to be 0.20. The distribution is leptokurtic; it is slightly more peaked than the normal (see figure no. 10.2).

10.2.3 Frequency distribution of Composite creativity scores

The total verbal and non-verbal test scores were added to obtain the composite creativity scores. The maximum and minimum scores obtained by the pupils were 382.4 and 143.0 respectively. The range of the scores was 239.4. The mean, median and mode obtained by the whole sample on the creative thinking test (Verbal + Non-verbal tests of creative thinking) were 250.0, 248.2 and 143.0 respectively. The SD was 37.4.

Table-10.4: Frequency distribution and descriptive statistics of composite creativity scores (standardised scores)

SNo	Class-Interval	Composite Creativity Scores (f)	Cumulative frequency	Smoothed frequency	Descriptive Statistics	Composite Creativity scores
1	140 - 179	8	8	26.7	Minimum	143.0
2	180 - 219	72	80	77.7	Maximum	382.4
3	220 - 259	153	233	109.3	Mean	250.0
4	260 - 299	103	336	97.0	Median	248.2
5	300 - 339	35	371	46.3	Mode	143.0
6	340 - 379	1	372	12.3	SD	37.4
7	380 - 419	1	373	0.7	SE_M	1.9
					Skewness	.27
					Kurtosis	.002
		373				

The skewness (Υ_1) for the composite creativity scores is 0.27, indicating the distribution is positively skewed. Kurtosis of the distribution was found to be 0.002, therefore the distribution of scores is normal (see fig.-10.3). In order to determine the 0.95 and 0.99 confidence interval limits of the population mean, the SE_M was calculated and found to be 1.9. The true values of the sample mean at 0.95 and 0.99 confidence interval limits were found to be 246.3 and 253.7,and 245.1 and 254.9 respectively.

10.3.0 Student background research questions.

The students' background variables studied are divided into two categories, (i) Students' personal data and (ii) Students' parental background for the presentation of the data analysis results. Students' personal variables include sex and age, whereas students' parental variables include education, occupation and income.

Statistical techniques were used to find out whether there was any significant difference between the means. If the F-ratio or t-value is significant either at 0.01 level or at

0.05 level, the null hypothesis (NH) is rejected and the difference between the means is taken to be the real difference and not a difference due to either chance error or sampling error. If the F-ratio or t-value is insignificant, then the null hypothesis (NH) is retained.

10.3.1. The students' personal background data analysis

An interval level measure was subject to statistical analysis to find out the correlation pattern of age with creative thinking. A correlation matrix (table-10.5) showed a negative significant relation ($r=-0.13$; $p<0.05$) with Age. A negative relationship with age indicates that as students get older creativity decreases.

Table 10.5: Inter-correlations between students' personal background variables and Creative Thinking (N=373)

Variable	1. Age	2. Creative Thinking
1. Age	1.00	-.13*
2. Creative Thinking (CT)		1.00

*** = Significant at 0.001 * = Significant at 0.05 # = Not significant

10.3.1.1. Sex differences in creative thinking

Verbal originality, verbal fluency, verbal flexibility, and total verbal creativity (total of the three components) of the subjects were analysed separately in relation to the sex of the students. The findings are presented in Table 10.6. Similarly, non-verbal originality, non-verbal elaboration, total non-verbal creativity (total of the two components) and Composite creativity (total of verbal + non-verbal scores) were also analysed and are presented in the same table. *The same pattern of presentation will be followed for the other variables in this entire chapter/study.*

From table 10.6, it can be seen that there is a t-value of 2.17, which is significant at 0.05 level. It is therefore inferred that there is a significant difference between girls and boys on verbal originality. Boys were better in verbal originality than girls. The t-values for verbal fluency, flexibility and total verbal creativity were found to be 0.32, 0.44 and 0.80 respectively; which were not significant even at 0.05 level. This indicates that the boys and girls do not differ significantly.

The mean difference for non-verbal originality was found to be highly significant between girls and boys ($t=3.17$; $p<0.01$). This implies that boys are stronger on non-verbal originality than girls. As for non-verbal elaboration, girls ($M=50.88$) performed better than boys ($M=48.64$); the t-value 2.12 ($p<0.05$) confirms the difference between girls and boys.

In the total for non-verbal creativity, no difference was found (t=0.61; p>0.05). This indicates that boys and girls do not differ significantly.

Table-10.6: Mean scores, SDs, SE_M and t-values for creative thinking of subjects (Ss) in relation to their sex.

Creativity components	Sex (Coded)	N	Mean	SD	SEM	t – values
Verbal originality	Girls (0)	226	49.10	9.82	0.65	2.17*
	Boys (1)	147	51.39	10.15	0.84	
Verbal fluency	Girls (0)	226	50.14	10.21	0.68	0.32#
	Boys (1)	147	49.80	9.72	0.80	
Verbal flexibility	Girls (0)	226	49.81	9.96	0.66	0.44#
	Boys (1)	147	50.28	10.08	0.83	
Total verbal creativity	Girls (0)	226	149.05	28.31	1.88	0.80#
	Boys (1)	147	151.47	28.71	2.37	
Non-verbal originality	Girls (0)	226	48.69	9.18	0.61	3.17**
	Boys (1)	147	52.01	10.88	0.90	
Non-verbal elaboration	Girls (0)	226	50.88	9.27	0.62	2.12*
	Boys (1)	147	48.64	10.93	0.90	
Total non-verbal creativity	Girls (0)	226	99.57	15.00	1.55	0.61#
	Boys (1)	147	100.65	18.81	1.00	
Composite creativity (Verbal + non-verbal)	Girls (0)	226	248.62	36.73	2.44	0.88#
	Boys (1)	147	252.12	38.43	3.17	

** = Significant at 0.01 * = Significant at 0.05 # = Not significant

Finally, the measures of composite creativity between boys and girls were not significantly different (t=0.88; p>0.05). The boys' mean (252.12) was higher than the girls' (248.62), but the difference was not statistically significant even at 0.05 level

In the past (in India), on the whole, boys dominated in all aspects of life over girls; gender differences in recent years have decreased due to the tremendous changes in the attitude of society towards the girls and deliberate measures to facilitate girls' participation in education by the Government and non-Governmental organisations. Girls are now more exposed to educational influences and parents are also adopting more liberal treatment of girls. The parents realise the importance of girls' education so they do not discourage girls as in the past.

In India, earlier, there were negative attitudes towards sending girls to school, prejudices against retaining them in school, restrictions on mobility especially after puberty, early marriage, and pressures to enter 'womanly' courses. These attitudes are known to affect the nature of participation of women in education. The gender bias existing in society has a direct bearing on many aspects of the education system (Review Committee of NPE'86,1990, p.29).

Discrimination between sons and daughters is gradually diminishing. Earlier, more freedom was given to sons than daughters. Now the imposition of rigid restrictions and certain conforming patterns of behaviour on girls by the society and culture is less strong compared to the earlier years. Girls have now entered into the competitive world and compete with boys in all fields. Hence, it is not surprising that girls can compete with boys even on creative performance.

10.3.3 Age group differences in creativity

Table 10.5 shows that age is significantly and negatively related (-.13, $p<0.05$) with creative thinking. To investigate which age groups significantly differed from the others, ANOVA was performed. The results are presented in table-10.7. The mean differences between the groups are also presented in the last column with an asterisk mark (*). This pattern of presentation will be followed to show the 'mean differences' in this entire chapter/study.

Table 10.7 exhibits the mean scores, SDs and F-ratios for creative thinking and its components in different age groups. There are significant differences in mean scores for verbal originality among the different age groups ($F= 2.51$; $p<0.05$). The 15 years age group scored less than all other groups but a statistically significant difference was found only with the 13 and 14 years age groups.

An examination of the same table shows that the F-ratios of verbal fluency ($F=5.59$, $p<0.0001$), verbal flexibility ($F=5.12$, $p<0.0001$), and total verbal creativity ($F=4.63$, $p<0.001$), were highly significant. This indicates a significant difference between the mean scores of the different age groups.

It may be seen from the same table that F-ratios for non-verbal originality ($F=1.14$), elaboration ($F=2.10$) and total non-verbal creativity ($F=1.30$) were not significantly different even at 0.05 level. This indicates that a non-significant mean difference was found among these groups.

As for composite creativity, the F-ratio was found to be 3.49, which is significant at 0.01 level. This shows significant mean differences among the groups between 15 years and 14 years old students.

Table-10.7: Mean scores, SDs, SE_M and F-values for creative thinking of subjects (Ss) in relation to age.

Creativity components	Age Group	N	Mean	SD	SE_M	F – ratio df = 5 / 367	Mean differences
Verbal originality	G1- 12 Yrs	9	48.49	4.90	1.63	2.51*	G4
	G2- 13 Yrs	83	50.13	10.01	1.10		G2 *
	G3- 14 Yrs	185	51.02	10.41	0.77		G3 *
	G4- 15 Yrs	73	46.76	7.90	0.92		
	G5- 16 Yrs	19	53.37	12.85	2.95		
	G6- 17 Yrs	4	47.00	7.78	3.89		
Verbal fluency	G1- 12 Yrs	9	49.75	4.38	1.46	5.59****	G4
	G2- 13 Yrs	83	51.06	8.74	0.96		G2 *
	G3- 14 Yrs	185	51.57	10.36	0.76		G3 *
	G4- 15 Yrs	73	45.00	9.15	1.07		
	G5- 16 Yrs	19	51.12	11.09	2.54		
	G6- 17 Yrs	4	42.28	7.89	3.94		
Verbal flexibility	G1- 12 Yrs	9	50.87	5.82	1.94	5.12****	G4
	G2- 13 Yrs	83	50.87	8.31	0.91		G2 *
	G3- 14 Yrs	185	51.37	10.35	0.76		G3 *
	G4- 15 Yrs	73	45.09	9.45	1.11		
	G5- 16 Yrs	19	52.43	11.65	2.67		
	G6- 17 Yrs	4	44.15	8.71	4.36		
Total verbal creativity	G1- 12 Yrs	9	149.11	12.14	4.05	4.63***	G4
	G2- 13 Yrs	83	152.06	25.28	2.77		G2 *
	G3- 14 Yrs	185	153.95	29.48	2.17		G3 *
	G4- 15 Yrs	73	136.86	25.31	2.96		
	G5- 16 Yrs	19	156.93	34.92	8.01		
	G6- 17 Yrs	4	133.43	23.57	11.79		
Non-verbal originality	G1- 12 Yrs	9	44.44	12.65	4.21	1.14#	
	G2- 13 Yrs	83	50.97	10.04	1.10		
	G3- 14 Yrs	185	49.87	9.76	0.72		
	G4- 15 Yrs	73	50.02	9.77	1.14		
	G5- 16 Yrs	19	51.06	11.42	2.62		
	G6- 17 Yrs	4	43.19	10.74	5.37		
Non-verbal elaboration	G1- 12 Yrs	9	50.63	10.25	3.42	2.10#	
	G2- 13 Yrs	83	51.86	9.71	1.07		
	G3- 14 Yrs	185	50.27	9.96	0.73		
	G4- 15 Yrs	73	48.69	11.03	1.29		
	G5- 16 Yrs	19	44.58	5.73	1.31		
	G6- 17 Yrs	4	46.68	3.18	1.59		
Total non-verbal creativity	G1- 12 Yrs	9	95.07	21.00	7.00	1.30#	
	G2- 13 Yrs	83	102.83	16.05	1.76		
	G3- 14 Yrs	185	100.13	16.12	1.18		
	G4- 15 Yrs	73	98.70	18.17	2.13		
	G5- 16 Yrs	19	95.64	14.64	3.36		
	G6- 17 Yrs	4	89.87	13.44	6.72		
Composite creativity (Verbal + non-verbal)	G1- 12 Yrs	9	244.18	23.24	7.75	3.49**	G4
	G2- 13 Yrs	83	254.90	33.76	3.71		
	G3- 14 Yrs	185	254.09	38.66	2.84		G3 *
	G4- 15 Yrs	73	235.56	35.38	4.14		
	G5- 16 Yrs	19	252.57	41.34	9.48		
	G6- 17 Yrs	4	223.29	32.06	16.03		

**** = Significant at 0.0001 *** = Significant at 0.001 ** = Significant at 0.01
* = Significant at 0.05 # = Not significant
Note: Mean differences between groups shown with asterisk mark (*).

From this it can be concluded that the creative thinking of the students may fluctuate according to their age. The results support the findings of Torrance (1962) (see 3.5.1) and Kishore (1981) (see 3.5.2). Here the results show that from 12 to 14 years mean creativity scores gradually increased (not non-verbal originality and elaboration), but by age 15 years there appears to have been a decline in many components of creativity (except non-verbal originality). This recovers for age 16 years, except non-verbal elaboration and total non-verbal mean scores. Again a setback took place for the 17 years age group.

10.3.4 Students' parental background data analysis

A correlation matrix (table-10.8) shows the Pearson 'r' correlation coefficient on the set of SES variables. There are other indicators of SES, such as ownership of land, building, cars, television, refrigerator etc.,. But asking all these particulars may be misunderstood and may not give reliable information because of possible income tax avoidance or legal problems. There are no problems in disclosing education and occupation. Of course the income reported may not be 100% correct but when verified with the school records confidentially was found to be generally accurate.

Father's and mother's income was highly correlated with their education ($r=.38$, $p<0.0001$ and $r=.19$, $p<0.001$) and with occupation ($r=.31$, $p<0.0001$ and $r=.58$, $p<0.0001$). Father's education and mother's education was highly correlated with their respective occupational categories ($r=.36$,$p<0.0001$ and $r=.27$, $p<0.0001$). It is generally true that highly educated people have better opportunities to occupy good positions and earn more than any uneducated or middle educated group.

Table-10.8: Inter-correlations between students' parental background variables and creative thinking

		Father			Mother			
Pearson coefficient of correlation (r)		1 Education	2 Occupation	3 Income	4 Education	5 Occupation	6 Income	7. Children's Creativity (CC)
Father	1.Education	1.0	.36****	.38****	.59****	.18****	.10*	.15**
	2.Occupation		1.0	.31****	.33****	.09#	.04#	.07#
	3.Income			1.0	.38****	.05#	.14**	.12*
Mother	4. Education				1.0	27****	.19***	.17***
	5.Occupation					1.0	58****	.11*
	6. Income						1.0	.16**
7. Children's Creativity (CC)								1.0

**** = Significant at 0.0001 *** = Significant at 0.001 ** = Significant at 0.01
* = Significant at 0.05 # = Not significant

A high correlation between father's education and mother's education (r=.59, p<0.0001) reflects Indian socio-cultural practices. In India, normally marriages are settled by elders looking at various factors like education, occupation and earnings. For example, a highly educated person looks for a highly educated bride. Of course there are some exceptions.

As for creativity, it was found that it correlated highly with mother's education (r= .17; p<0.001), mother's income (r= .16; p<0.01) and father's education (r=.15; p<0.01), moderately with mother's occupation (r= .11; p<0.05) and father's income (r= .12; p<0.05). There was no significant relation with father's occupation.

Further analysis, ANOVA, was applied to study the variance in creative thinking. The results of the ANOVA and the mean differences between the groups are presented in the tables 10.9 to 10.14, along with their mean scores, SDs, standard error of mean (SE_M) and weights (ranging from 0-7) or the codes given.

10.3.5 Fathers' education and children's creativity

Table-10.9 indicates that only 26.3% of fathers completed their college education (Inter to PG). The remaining 73.7% completed school education or less. Among these 6.8% of fathers of the government school students were illiterate.

The analysis of variance (ANOVA) was performed to see whether significant mean differences existed among the students in relation to their fathers' education level. The F-ratio 4.71 shows that the differences in verbal originality were statistically significant at 0.0001 level between groups of students based on their fathers' educational qualifications. The 'mean differences' between the groups are presented in Table 10.9. The F-ratio for verbal fluency was found to be 1.82, which is not significant at 0.05 level. But differences were found in verbal flexibility (F=2.40, p<0.05) and total verbal creativity (F=2.97, p<.01).

An examination of the same table of F-ratio of non-verbal originality (F=3.01) indicates significant differences at 0.01 level. The 'mean differences' between the groups are shown in the same table. However the F-ratios of non-verbal and total non-verbal creativity scores were not significant, even at 0.05 level.

As for composite creativity (verbal + non-verbal), the F-ratio was found to be 3.32 which is significant at 0.01 level. There were significant differences between the groups.

Except for the group whose fathers were illiterate, there was a significant increase in the mean score obtained by the students whose fathers had higher education levels. Generally, better education in fathers relates to greater creativity. Why the children with illiterate fathers do not fall into this pattern is not clear and requires further research.

10.3.6 Mothers' education and children's creativity

The data presented in Table 10.10 reveals that 6.7% of mothers completed college education (Inter to PG) and 93.3% of mothers completed their school education or less. Among them 25.7% were illiterate.

An analysis of variance (ANOVA) was performed to see whether any significant mean differences existed among the students on the basis of their mothers' educational qualifications (see table 10.10). The F-ratio 4.83 for verbal originality indicates significant mean differences among the groups whose mothers had different educational backgrounds. The F-ratio for verbal fluency was found to be 1.58, which is not significant at 0.05 level. But mean differences were found in verbal flexibility ($F=2.20$, $p<0.05$) and total verbal creativity ($F=2.89$, $p<0.01$).

As shown in the same table, F-ratios for non-verbal originality, elaboration and total non-verbal creativity were 0.86, 0.83 and 0.79 respectively. This indicates that there is no significant difference among the groups whose mothers have different educational backgrounds.

Lastly, an analysis of variance was performed on the composite creativity scores in order to examine the variation in the means obtained by the students whose mothers had different educational backgrounds (table-10.10). The F-ratio 2.16 shows a significant mean difference at 0.05 level. Overall, the greater the level of the mother's education the higher the level of verbal creativity. This did not apply to non-verbal creativity, where the difference was insignificant. Even in verbal creativity, the relationship was not always linear.

Table-10.9: Mean scores, SDs, SE_M and F-values for creative thinking of subjects (Ss) in relation to the father education levels.

Creativity components	Father education Level (Weights)	N	Mean	SD	SE_M	F – ratio df= 6 / 365	Mean differences
Verbal originality	G1- Illiterate (1)	26	48.49	7.85	1.54	4.71****	G5 G6 G2 * * G3 * G4 *
	G2- Primary (or lower) (2)	78	48.05	7.34	0.83		
	G3- Upper Primary (3)	48	47.91	7.63	1.10		
	G4- Secondary (4)	122	48.96	9.93	0.90		
	G5- Intermediate (5)	31	54.29	10.43	1.87		
	G6- Graduates (6)	55	54.00	12.16	1.64		
	G7- Postgraduates (7)	12	56.56	16.00	4.62		
Verbal fluency	G1- Illiterate (1)	26	52.15	7.77	1.52	1.82#	
	G2- Primary (or lower) (2)	78	48.46	9.33	1.06		
	G3- Upper Primary (3)	48	48.15	8.83	1.27		
	G4- Secondary (4)	122	49.42	10.30	0.93		
	G5- Intermediate (5)	31	52.16	9.99	1.79		
	G6- Graduates (6)	55	52.60	10.84	1.46		
	G7- Postgraduates (7)	12	52.08	13.48	3.89		
Verbal flexibility	G1- Illiterate (1)	26	50.82	7.07	1.39	2.40*	G5 G6 G2 * * G3 * * G4 *
	G2- Primary (or lower) (2)	78	48.13	9.07	1.03		
	G3- Upper Primary (3)	48	47.93	8.82	1.27		
	G4- Secondary (4)	122	49.49	10.36	0.94		
	G5- Intermediate (5)	31	53.30	10.55	1.89		
	G6- Graduates (6)	55	52.98	10.67	1.44		
	G7- Postgraduates (7)	12	52.22	13.43	3.88		
Total verbal creativity	G1- Illiterate (1)	26	151.46	21.02	4.12	2.97**	G5 G6 G2 * * G3 * * G4 * *
	G2- Primary (or lower) (2)	78	144.64	24.44	2.77		
	G3- Upper Primary (3)	48	143.99	23.80	3.44		
	G4- Secondary (4)	122	147.86	28.93	2.62		
	G5- Intermediate (5)	31	159.74	29.46	5.29		
	G6- Graduates (6)	55	159.57	32.31	4.36		
	G7- Postgraduates (7)	12	160.86	41.53	11.99		
Non-verbal originality	G1- Illiterate (1)	26	53.02	10.26	2.01	3.01**	G1 G6 G7 G2 * * G3 * G4 * * * G5 * G6 *
	G2- Primary (or lower) (2)	78	49.47	9.82	1.11		
	G3- Upper Primary (3)	48	49.49	10.92	1.58		
	G4- Secondary (4)	122	48.13	8.67	0.78		
	G5- Intermediate (5)	31	50.49	9.14	1.64		
	G6- Graduates (6)	55	51.71	10.88	1.47		
	G7- Postgraduates (7)	12	58.60	12.79	3.69		
Non-verbal elaboration	G1- Illiterate (1)	26	53.03	13.59	2.67	1.15#	
	G2- Primary (or lower) (2)	78	48.78	9.70	1.10		
	G3- Upper Primary (3)	48	49.67	11.09	1.60		
	G4- Secondary (4)	122	49.45	9.46	0.86		
	G5- Intermediate (5)	31	52.28	10.41	1.87		
	G6- Graduates (6)	55	51.07	8.95	1.21		
	G7- Postgraduates (7)	12	47.57	6.73	1.94		
Total non-verbal creativity	G1- Illiterate (1)	26	106.05	21.37	4.19	1.87#	
	G2- Primary (or lower) (2)	78	98.25	16.65	1.89		
	G3- Upper Primary (3)	48	99.15	18.73	2.70		
	G4- Secondary (4)	122	97.59	15.23	1.37		
	G5- Intermediate (5)	31	102.77	16.51	2.97		
	G6- Graduates (6)	55	102.78	14.68	1.98		
	G7- Postgraduates (7)	12	106.18	14.23	4.11		
Composite creativity (Verbal + non-verbal)	G1- Illiterate (1)	26	257.51	34.92	6.85	3.32**	G5 G6 G7 G2 * * * G3 * * * G4 * *
	G2- Primary (or lower) (2)	78	242.90	34.15	3.87		
	G3- Upper Primary (3)	48	243.15	32.17	4.64		
	G4- Secondary (4)	122	245.44	36.47	3.30		
	G5- Intermediate (5)	31	262.51	39.92	7.17		
	G6- Graduates (6)	55	262.35	39.56	5.33		
	G7- Postgraduates (7)	12	267.03	52.49	15.15		

**** = Significant at 0.0001 *** = Significant at 0.001 ** = Significant at 0.01

* = Significant at 0.05 # = Not significant

Table-10.10: Mean scores, SDs, SE_M and F-values for creative thinking of subjects (Ss) in relation to the Mother education levels.

Creativity components	Mother education Level (weights)	N	Mean	SD	SE_M	F – ratio Df = 6 / 366	Mean differences
Verbal originality	G1- Illiterate (1)	96	48.61	7.47	0.76	4.83****	G1 G2 G3
	G2- Primary (or lower) (2)	131	48.87	8.73	0.76		
	G3- Upper Primary (3)	38	48.24	8.80	1.43		
	G4- Secondary (4)	83	51.54	11.04	1.21		
	G5- Intermediate (5)	12	58.93	17.85	5.15		G5 * * *
	G6- Graduates (6)	10	57.44	13.26	4.19		
	G7- Postgraduates (7)	3	63.52	25.63	14.80		
Verbal fluency	G1- Illiterate (1)	96	48.53	9.18	0.94	1.58#	
	G2- Primary (or lower) (2)	131	49.68	9.77	0.85		
	G3- Upper Primary (3)	38	48.86	9.35	1.52		
	G4- Secondary (4)	83	51.46	10.76	1.18		
	G5- Intermediate (5)	12	55.04	11.31	3.27		
	G6- Graduates (6)	10	52.64	11.77	3.72		
	G7- Postgraduates (7)	3	56.28	15.71	9.07		
Verbal flexibility	G1- Illiterate (1)	96	48.33	9.15	0.93	2.20*	G1 G2 G3
	G2- Primary (or lower) (2)	131	49.44	9.27	0.81		
	G3- Upper Primary (3)	38	48.96	10.01	1.62		
	G4- Secondary (4)	83	51.83	10.99	1.21		
	G5- Intermediate (5)	12	56.14	10.81	3.12		G5 * * *
	G6- Graduates (6)	10	52.49	12.97	4.10		
	G7- Postgraduates (7)	3	57.15	13.46	7.77		
Total verbal creativity	G1- Illiterate (1)	96	145.46	24.20	2.47	2.89**	G1 G2 G3
	G2- Primary (or lower) (2)	131	147.99	26.45	2.31		
	G3- Upper Primary (3)	38	146.07	26.46	4.29		
	G4- Secondary (4)	83	154.83	31.29	3.43		
	G5- Intermediate (5)	12	170.11	39.27	11.34		G5 * * *
	G6- Graduates (6)	10	162.57	36.34	11.49		
	G7- Postgraduates (7)	3	176.95	54.26	31.33		
Non-verbal originality	G1- Illiterate (1)	96	49.81	10.44	1.07	0.86#	
	G2- Primary (or lower) (2)	131	49.19	10.10	0.88		
	G3- Upper Primary (3)	38	51.26	8.62	1.40		
	G4- Secondary (4)	83	50.06	8.90	0.98		
	G5- Intermediate (5)	12	53.59	11.76	3.40		
	G6- Graduates (6)	10	54.02	12.86	4.07		
	G7- Postgraduates (7)	3	45.95	20.53	11.85		
Non-verbal elaboration	G1- Illiterate (1)	96	49.94	11.06	1.13	0.83#	
	G2- Primary (or lower) (2)	131	49.13	9.47	0.83		
	G3- Upper Primary (3)	38	52.81	7.95	1.29		
	G4- Secondary (4)	83	50.02	10.12	1.11		
	G5- Intermediate (5)	12	50.72	11.85	3.42		
	G6- Graduates (6)	10	48.62	11.31	3.58		
	G7- Postgraduates (7)	3	54.95	3.79	2.19		
Total non-verbal creativity	G1- Illiterate (1)	96	99.75	18.67	1.91	0.79#	
	G2- Primary (or lower) (2)	131	98.32	16.12	1.41		
	G3- Upper Primary (3)	38	104.07	13.33	2.16		
	G4- Secondary (4)	83	100.08	15.27	1.68		
	G5- Intermediate (5)	12	104.31	19.32	5.58		
	G6- Graduates (6)	10	102.63	19.06	6.03		
	G7- Postgraduates (7)	3	100.89	23.93	13.81		
Composite creativity (Verbal + non-verbal)	G1- Illiterate (1)	96	245.21	34.85	3.56	2.16*	G1 G2 G3
	G2- Primary (or lower) (2)	131	246. 31	34.85	3.05		
	G3- Upper Primary (3)	38	250.14	30.47	4.94		
	G4- Secondary (4)	83	254.91	38.98	4.28		
	G5- Intermediate (5)	12	274.42	56.35	16.27		G5 * * *
	G6- Graduates (6)	10	265.20	51.08	16.15		
	G7- Postgraduates (7)	3	277.84	76.77	44.33		

**** = Significant at 0.0001 ** = = Significant at 0.01 *= Significant at 0.05 # = Not significant

10.3.7 Fathers' occupations and children's creativity

The fathers' occupations were classified under eight categories on the basis of the National Classification of Occupations[4]. Table 10.11 shows the fathers' occupations of the students (N=373) in the government schools. Mostly, fathers were working as production and transport equipment operators (137 or 36.7%), clerical & related workers (67 or 18%), sales workers (65 or 17.4%) or service workers (55 or 14.8%). Very few (each category less than 7%) of them represented other categories, for example professional, engineering, technical & related workers, administrative, executive and managerial workers, dependents, and Farmers, fishermen & related workers. The majority of the fathers' occupations were low in status (see Appendix E3).

The main reason for undertaking these lower cadre occupations could be their low level of education. If we examine Table 9.9, 274 (or 73.5%) students' fathers had studied only up to secondary school level. In general, higher level occupations, either in Government or non-government organisations, are offered on the basis of education and further promotions are made on either acquisition of additional qualifications or experience.

Table 10.11 reveals non-significant differences in mean scores of verbal originality ($F=0.79$, $p>0.05$), fluency ($F=0.63$, $p>0.05$), flexibility ($F=0.79$, $p>0.05$) and total verbal creativity ($F=0.75$, $p>0.05$) among groups with different fathers' occupation levels.

It can also be seen from the same table that the F-ratios for non-verbal originality ($F=1.20$, $p>0.05$), non-verbal elaboration ($F=0.78$, $p>0.05$) and total non-verbal creativity ($F=0.48$, $p>0.05$) did not significantly differ at 0.05 level. This indicates that the fathers' occupation does not influence their child's creativity.

As far as composite creativity was concerned, the obtained mean differences among the different groups were not significantly different ($F=0.46$, $p>0.05$).

10.3.8 Mothers' occupations and their children's creativity

The mothers' occupations were classified under the same categories as fathers' occupational categories. Table 10.12 shows that 83.9% of the mothers' were house wives/dependents. Only 8% of the mothers were doing production and transport equipment operators' jobs. The rest were doing other categories of jobs, like service work, sales work, clerical and related, and professional, engineering, technical & related work (each category was less than 3%) (see Appendix E3).

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[4] National Classification of Occupations (1963, 1991) as adopted by the Office of Registrar General and Census Commission for India, Ministry of Home Affairs, Govt of India, 1991.

Table-10.11: Mean scores, SDs, SE_M and F-values for creative thinking of subjects (Ss) in relation to the fathers' occupational levels.(N=373)

Creativity components	Fathers' occupational levels (weights)	N	Mean	SD	SE_M	F –ratio df= 7 / 365	Mean differences
Verbal originality	G0- Dependents (0)	14	47.68	8.07	2.16	0.79#	
	G1- Production & Transport (1)	137	48.99	8.74	0.75		
	G2- Farmers, Fisherman (2)	7	48.96	9.48	3.58		
	G3- Service workers (3)	55	51.08	9.60	1.29		
	G4- Sales workers (4)	65	49.59	9.76	1.21		
	G5- Clerical & related (5)	67	51.16	11.65	1.42		
	G6- Administrative (6)	4	52.96	10.21	5.10		
	G7- Professional & Technical (7)	24	52.36	14.04	2.87		
Verbal fluency	G0- Dependents (0)	14	47.68	10.29	2.75	0.63#	
	G1- Production & Transport (1)	137	49.65	9.62	0.82		
	G2- Farmers, Fisherman (2)	7	46.81	11.03	4.17		
	G3- Service workers (3)	55	51.60	9.89	1.33		
	G4- Sales workers (4)	65	49.00	10.48	1.30		
	G5- Clerical & related (5)	67	50.67	10.06	1.23		
	G6- Administrative (6)	4	51.15	8.97	4.49		
	G7- Professional & Technical (7)	24	51.30	11.13	2.27		
Verbal flexibility	G0- Dependents (0)	14	47.51	9.70	2.59	0.79#	
	G1- Production & Transport (1)	137	49.24	9.32	0.80		
	G2- Farmers, Fisherman (2)	7	46.27	11.00	4.16		
	G3- Service workers (3)	55	51.83	9.75	1.32		
	G4- Sales workers (4)	65	49.59	11.48	1.42		
	G5- Clerical & related (5)	67	50.75	9.87	1.21		
	G6- Administrative (6)	4	51.55	8.81	4.41		
	G7- Professional & Technical (7)	24	51.38	10.72	2.19		
Total verbal creativity	G0- Dependents (0)	14	142.88	27.09	7.24	0.75#	
	G1- Production & Transport (1)	137	147.88	26.26	2.24		
	G2- Farmers, Fisherman (2)	7	142.04	30.13	11.39		
	G3- Service workers (3)	55	154.51	27.23	3.67		
	G4- Sales workers (4)	65	148.18	30.06	3.73		
	G5- Clerical & related (5)	67	152.58	30.27	3.70		
	G6- Administrative (6)	4	155.66	27.32	13.66		
	G7- Professional & Technical (7)	24	155.04	34.58	7.06		
Non-verbal originality	G0- Dependents (0)	14	53.39	12.52	3.35	1.20#	
	G1- Production & Transport (1)	137	49.42	9.35	0.80		
	G2- Farmers, Fisherman (2)	7	51.03	15.86	5.99		
	G3- Service workers (3)	55	49.60	10.39	1.40		
	G4- Sales workers (4)	65	50.02	10.30	1.28		
	G5- Clerical & related (5)	67	49.35	8.19	1.00		
	G6- Administrative (6)	4	61.23	8.00	4.00		
	G7- Professional & Technical (7)	24	51.83	12.68	2.59		
Non-verbal elaboration	G0- Dependents (0)	14	48.22	10.41	2.78	0.78#	
	G1- Production & Transport (1)	137	50.37	9.31	0.80		
	G2- Farmers, Fisherman (2)	7	46.22	15.96	6.03		
	G3- Service workers (3)	55	49.44	10.05	1.35		
	G4- Sales workers (4)	65	51.36	11.63	1.44		
	G5- Clerical & related (5)	67	50.20	9.61	1.17		
	G6- Administrative (6)	4	50.99	8.36	4.18		
	G7- Professional & Technical (7)	24	46.81	8.16	1.67		
Total non-verbal creativity	G0- Dependents (0)	14	101.61	20.00	5.35	0.48#	
	G1- Production & Transport (1)	137	99.79	15.49	1.32		
	G2- Farmers, Fisherman (2)	7	97.24	29.80	11.26		
	G3- Service workers (3)	55	99.04	17.11	2.31		
	G4- Sales workers (4)	65	101.38	18.59	2.31		
	G5- Clerical & related (5)	67	99.55	14.75	1.80		
	G6- Administrative (6)	4	112.22	11.00	5.50		
	G7- Professional & Technical (7)	24	98.65	15.67	3.20		
Composite creativity (Verbal + non-verbal)	G0- Dependents (0)	14	244.49	39.58	10.58	0.46#	
	G1- Production & Transport (1)	137	247.67	34.99	2.99		
	G2- Farmers, Fisherman (2)	7	239.28	45.23	17.10		
	G3- Service workers (3)	55	253.55	34.84	4.70		
	G4- Sales workers (4)	65	249.56	40.00	4.96		
	G5- Clerical & related (5)	67	252.13	37.99	4.64		
	G6- Administrative (6)	4	267.88	37.43	18.72		
	G7- Professional & Technical (7)	24	253.69	46.21	9.43		

£ Significant at 0.01 # Not significant

Table-10.12: Mean scores, SDs, SE_M and F-values for creative thinking of subjects (Ss) in relation to the mothers' occupational levels.

Creativity components	Mothers' occupational levels (Weights)	N	Mean	SD	SE_M	F – ratio df= 5 / 367	Mean differences
	G0- House wife/ Dependents (0)	313	49.56	9.64	0.55		G1 G4
	G1- Production & Transport (1)	30	51.03	9.95	1.82		
	G3- Service workers (3)	7	51.14	11.55	4.37	3.10**	
Verbal	G4- Sales workers (4)	5	44.24	8.56	3.83		
originality	G5- Clerical & related (5)	9	53.13	11.69	3.90		
	G7- Professional & Technical (7)	9	61.31	14.26	4.75		G7 * *
	G0- House wife/ Dependents (0)	313	49.75	9.81	0.55		
	G1- Production & Transport (1)	30	50.12	9.94	1.81		
	G3- Service workers (3)	7	53.48	9.70	3.67	1.67#	
Verbal	G4- Sales workers (4)	5	43.40	18.55	8.30		
fluency	G5- Clerical & related (5)	9	52.34	10.25	3.42		
	G7- Professional & Technical (7)	9	57.11	9.42	3.14		
	G0- House wife/ Dependents (0)	313	49.79	9.88	0.56		
	G1- Production & Transport (1)	30	49.53	9.76	1.78		
	G3- Service workers (3)	7	54.14	8.50	3.21	1.84#	
	G4- Sales workers (4)	5	42.81	17.19	7.69		
Verbal	G5- Clerical & related (5)	9	52.37	10.05	3.35		
flexibility	G7- Professional & Technical (7)	9	57.15	9.02	3.01		
	G0- House wife/ Dependents (0)	313	149.09	27.77	1.57		G1 G4
	G1- Production & Transport (1)	30	150.68	28.12	5.13		
	G3- Service workers (3)	7	158.76	29.43	11.13	2.30*	
Total verbal	G4- Sales workers (4)	5	130.45	43.39	19.40		
creativity	G5- Clerical & related (5)	9	157.84	31.01	10.34		
	G7- Professional & Technical (7)	9	175.57	31.66	10.55		G7 * *
	G0- House wife/ Dependents (0)	313	49.91	9.70	0.55		
	G1- Production & Transport (1)	30	47.95	10.90	1.99		
	G3- Service workers (3)	7	50.81	7.56	2.86	1.30#	
Non-verbal	G4- Sales workers (4)	5	53.86	5.79	2.59		
originality	G5- Clerical & related (5)	9	50.29	8.50	2.83		
	G7- Professional & Technical (7)	9	56.97	18.29	6.10		
	G0- House wife/ Dependents (0)	313	50.18	9.80	0.55		
	G1- Production & Transport (1)	30	47.68	11.29	2.06		
	G3- Service workers (3)	7	52.84	14.51	5.48	0.80#	
Non-verbal	G4- Sales workers (4)	5	46.89	11.65	5.21		
elaboration	G5- Clerical & related (5)	9	53.03	10.12	3.38		
	G7- Professional & Technical (7)	9	47.76	8.39	2.80		
	G0- House wife/ Dependents (0)	313	100.09	16.05	0.91		
	G1- Production & Transport (1)	30	95.63	19.38	3.54		
Total non-	G3- Service workers (3)	7	103.66	20.41	7.71	0.70#	
verbal	G4- Sales workers (4)	5	100.76	16.73	7.48		
creativity	G5- Clerical & related (5)	9	103.32	15.80	5.27		
	G7- Professional & Technical (7)	9	104.73	23.95	7.98		
	G0- House wife/ Dependants (0)	313	249.18	36.07	2.04		
Composite	G1- Production & Transport (1)	30	246.32	41.94	7.66		
creativity	G3- Service workers (3)	7	262.42	39.59	14.96	1.86#	
(Verbal +	G4- Sales workers (4)	5	231.21	58.21	26.03		
non-verbal)	G5- Clerical & related (5)	9	261.16	29.20	9.73		
	G7- Professional & Technical (7)	9	280.30	50.99	17.00		

** = Significant at 0.01 * = Significant at 0.05 # = Not significant

The F-ratio 3.10 for verbal originality indicates significant mean differences among the groups whose mothers had different occupational backgrounds. No significant differences were found for verbal fluency ($F=1.67$, $p>0.05$) or verbal flexibility (1.84, $p>0.05$). However, a significant difference was found for total verbal creativity ($F=2.30$, $p<0.05$).

Non-significant differences were found for non-verbal originality ($F=1.30$, $p>0.05$), non-verbal fluency ($F=0.80$, $p>0.05$) and total non-verbal creativity ($F=0.70$, $p>0.05$).

Finally a non-significant mean difference was also found in composite creativity ($F=1.86$, $p>0.05$). Generally, where mothers are working in higher level occupations their children's verbal creativity is higher. This does not apply to non-verbal creativity.

10.3.9 Fathers' income and children's creativity

The data in Table-10.13 reveal that 4.8% of the fathers' had no income, 27.1% had below Rs. 1000, 48.5% had between Rs. 1001-Rs.3000, and 19.6% had above Rs. 3000 per month. When these were used to compare creativity scores, the F-ratio for verbal originality was found to be 2.68, which is significant at 0.05 level. However the F-ratios for verbal fluency ($F=0.88$, $p>0.05$), flexibility ($F=1.29$, $p>0.05$) total verbal creativity ($F=1.61$, $p>0.05$) were not significant even at 0.05 level.

With regard to the total non-verbal creativity ($F=0.55$, $p>0.05$) and its components originality ($F=1.05$, $p>0.05$) and elaboration ($F=0.71$, $p>0.05$), the differences in means were also not significant.

As far as composite creativity was concerned, the F-ratio was found to be 1.19 which was not significant even at 0.05 level. Fathers' income, overall, does not appear to influence their children's measured creativity.

10.3.10 Mothers' income and their children's creativity

The data in Table-10.14 reveal that 70.5% of the mothers were not earning anything. Many were neither well educated nor in good occupations. When we examine Tables 10.10 and 10.12 it is clear that the majority (93.7%) of the mothers had only completed school education and 83.9% of them were housewives.

Table-10.13: Mean scores, SDs, SE_M and F-values for creative thinking of subjects (Ss) in relation to the father s' income levels.

Creativity components	Fathers' income levels (Weights)	N	Mean	SD	SE_M	F – ratio df= 6 / 366	Mean differences
Verbal originality	G0- No income (0)	18	46.64	8.24	1.94	2.68*	G1
	G1- below Rs1000 (1)	101	47.96	7.53	0.75		
	G2- Rs1001-2000 (2)	97	50.00	9.27	0.94		
	G3- Rs 2001-3000 (3)	84	50.97	10.67	1.16		
	G4- Rs 3001-4000 (4)	42	51.01	11.20	1.73		
	G5- Rs 4001-5000 (5)	18	52.72	13.86	3.27		
	G6- Rs 5001-above (6)	13	57.26	15.05	4.17		G7 *
Verbal fluency	G0- No income (0)	18	46.58	10.78	2.54	0.88#	
	G1- below Rs1000 (1)	101	49.42	9.23	0.92		
	G2- Rs1001-2000 (2)	97	49.86	10.04	1.02		
	G3- Rs 2001-3000 (3)	84	50.92	9.31	1.02		
	G4- Rs 3001-4000 (4)	42	50.10	11.32	2.67		
	G5- Rs 4001-5000 (5)	18	50.01	11.32	2.67		
	G6- Rs 5001-above (6)	13	54.06	13.94	3.87		
Verbal flexibility	G0- No income (0)	18	46.39	10.36	2.44	1.29#	
	G1- below Rs1000 (1)	101	48.74	8.85	0.88		
	G2- Rs1001-2000 (2)	97	49.90	10.00	1.02		
	G3- Rs 2001-3000 (3)	84	51.11	9.57	1.04		
	G4- Rs 3001-4000 (4)	42	50.97	11.34	1.75		
	G5- Rs 4001-5000 (5)	18	50.58	11.05	2.60		
	G6- Rs 5001-above (6)	13	54.18	13.50	3.75		
Total verbal creativity	G0- No income (0)	18	139.62	28.43	6.70	1.61#	
	G1- below Rs1000 (1)	101	146.13	24.06	2.39		
	G2- Rs1001-2000 (2)	97	149.77	27.72	2.81		
	G3- Rs 2001-3000 (3)	84	153.00	28.08	3.06		
	G4- Rs 3001-4000 (4)	42	152.09	32.25	4.98		
	G5- Rs 4001-5000 (5)	18	153.31	34.58	8.15		
	G6- Rs 5001-above (6)	13	165.50	40.46	11.22		
Non-verbal originality	G0- No income (0)	18	52.38	11.43	2.69	1.05#	
	G1- below Rs1000 (1)	101	49.12	9.29	0.92		
	G2- Rs1001-2000 (2)	97	51.26	10.58	1.07		
	G3- Rs 2001-3000 (3)	84	48.85	10.66	1.16		
	G4- Rs 3001-4000 (4)	42	49.10	8.26	1.27		
	G5- Rs 4001-5000 (5)	18	52.88	8.31	1.96		
	G6- Rs 5001-above (6)	13	50.53	11.51	3.19		
Non-verbal elaboration	G0- No income (0)	18	48.78	10.19	2.40	0.71#	
	G1- below Rs1000 (1)	101	50.29	9.25	0.92		
	G2- Rs1001-2000 (2)	97	48.96	10.47	1.06		
	G3- Rs 2001-3000 (3)	84	50.68	11.22	1.22		
	G4- Rs 3001-4000 (4)	42	48.94	8.36	1.29		
	G5- Rs 4001-5000 (5)	18	52.67	9.02	2.13		
	G6- Rs 5001-above (6)	13	52.40	10.25	2.84		
Total non-verbal creativity	G0- No income (0)	18	101.15	17.85	4.21	0.55#	
	G1- below Rs1000 (1)	101	99.41	15.92	1.58		
	G2- Rs1001-2000 (2)	97	100.21	17.49	1.78		
	G3- Rs 2001-3000 (3)	84	99.53	18.69	2.04		
	G4- Rs 3001-4000 (4)	42	98.03	12.30	1.90		
	G5- Rs 4001-5000 (5)	18	105.55	13.81	3.26		
	G6- Rs 5001-above (6)	13	102.94	15.66	4.34		
Composite creativity (Verbal + non-verbal)	G0- No income (0)	18	240.78	38.73	9.13	1.19#	
	G1- below Rs1000 (1)	101	245.53	32.26	3.21		
	G2- Rs1001-2000 (2)	97	249.98	38.38	3.90		
	G3- Rs 2001-3000 (3)	84	252.53	37.19	4.06		
	G4- Rs 3001-4000 (4)	42	250.12	38.98	6.01		
	G5- Rs 4001-5000 (5)	18	258.86	44.16	10.41		
	G6- Rs 5001-above (6)	13	268.44	49.21	13.65		

* = Significant at 0.05 # = Not significant

Table-10.14: Mean scores, SDs, SE_M and F-values for creative thinking of subjects (Ss) in relation to the mothers' income levels.

Creativity components	Mothers' income levels (Weights)	N	Mean	SD	SE_M	F – ratio df= 4 / 368	Mean differences
	G0- No income (0)	263	49.32	9.14	0.56		G0 G1 G2
	G1- below Rs 1000- (1)	90	50.53	10.82	1.14		
	G2- Rs 1001-2000 (2)	9	53.06	10.60	3.53	3.70**	
Verbal	G3- Rs 2001-3000 (3)	7	56.54	18.64	7.04		
originality	G4- Rs 3001-4000 (4)	4	65.07	12.33	6.17		G4 * * *
	G0- No income (0)	263	49.30	9.68	0.60		G0 G1
	G1- below Rs 1000- (1)	90	50.80	10.74	1.13		
	G2- Rs 1001-2000 (2)	9	54.52	8.28	2.76	2.49*	
Verbal	G3- Rs 2001-3000 (3)	7	54.28	11.07	4.18		
fluency	G4- Rs 3001-4000 (4)	4	60.95	7.11	3.56		G4 * *
	G0- No income (0)	263	49.42	9.85	0.61		G0 G1
	G1- below Rs 1000- (1)	90	50.26	10.31	1.09	2.94*	
Verbal	G2- Rs 1001-2000 (2)	9	54.76	7.62	2.54		
flexibility	G3- Rs 2001-3000 (3)	7	54.52	9.87	3.73		
	G4- Rs 3001-4000 (4)	4	63.31	5.53	2.76		G4 * *
	G0- No income (0)	263	148.03	27.19	1.68		G0 G1
	G1- below Rs 1000- (1)	90	151.59	30.30	3.19	3.31**	
	G2- Rs 1001-2000 (2)	9	162.33	24.28	8.09		
Total verbal	G3- Rs 2001-3000 (3)	7	165.35	38.40	14.51		
creativity	G4- Rs 3001-4000 (4)	4	189.32	24.26	12.13		G4 * *
	G0- No income (0)	263	49.76	9.88	0.61		
	G1- below Rs 1000- (1)	90	49.95	10.06	1.06		
	G2- Rs 1001-2000 (2)	9	55.97	10.06	3.35	0.94#	
Non-verbal	G3- Rs 2001-3000 (3)	7	52.32	10.77	4.07		
originality	G4- Rs 3001-4000 (4)	4	49.20	15.56	7.78		
	G0- No income (0)	263	49.61	9.90	0.61		
	G1- below Rs 1000- (1)	90	50.67	9.81	1.03		
	G2- Rs 1001-2000 (2)	9	52.43	9.97	3.32	0.56#	
Non-verbal	G3- Rs 2001-3000 (3)	7	50.07	16.50	6.23		
elaboration	G4- Rs 3001-4000 (4)	4	54.77	10.51	5.26		
	G0- No income (0)	263	99.37	16.47	1.02		
	G1- below Rs 1000- (1)	90	100.62	16.53	1.74		
Total non-	G2- Rs 1001-2000 (2)	9	108.40	12.31	4.10	0.80#	
verbal	G3- Rs 2001-3000 (3)	7	102.39	25.43	9.61		
creativity	G4- Rs 3001-4000 (4)	4	103.97	18.63	9.32		
	G0- No income (0)	263	247.40	35.93	2.22		G0 G1
Composite	G1- below Rs 1000- (1)	90	252.21	38.98	4.11		
creativity	G2- Rs 1001-2000 (2)	9	270.73	27.79	9.26	2.88*	
(Verbal +	G3- Rs 2001-3000 (3)	7	267.73	57.90	21.89		
non-verbal)	G4- Rs 3001-4000 (4)	4	293.30	39.13	19.56		G4 * *

** = Significant at 0.01 * = Significant at 0.05 # = Not significant

An examination of Table-10.14 shows that the F-ratios of verbal originality ($F=3.70$, $p<0.01$), fluency ($F=2.49$, $p<0.05$), flexibility ($F=2.94$, $p<0.01$) and total verbal creativity ($F=3.31$, $p<0.01$) indicate significant differences at various levels (0.05 or 0.01). The children of the highest income groups obtained higher scores than the lower income groups.

Non-significant mean differences were found for non-verbal originality (F=0.94, p>0.05), elaboration (F=0.56, p>0.05) and total non-verbal creativity (F=0.80, p>0.05).

As far as composite creativity was concerned, the F-ratio was found to be 2.88 which was significant at 0.05 level. The highest income group (Rs 3001-4000) scored the highest and the lowest income group (no income) achieved the least mean score on composite creativity. Again, the main influence appear to be on verbal rather than non-verbal creativity.

10.4.0 Organisational factors and students' creativity

Statistical analyses were undertaken to examine the relationship between organisational factors and creativity scores. The inter-correlations in Table 10.15 indicate that medium of instruction was significantly related ($p<0.05$) to the creativity score (composite). The negative relationship[5] ($r= -.12$) can be interpreted as indicating that the students from Telugu medium schools (dummy code=0) performed better than those from English medium schools (dummy code=1). To explore this further, a t-test analysis was performed. These findings are presented in table-10.15. The type of school (categorical independent variable) has three groups: girls' schools, boys' schools and co-educational schools. These three groups were coded by assigning an arbitrary number. The simplest method of creating a dummy variable is to assign 1's to subjects of a group one wishes to identify and 0's to all other subjects. This system of allocating 1's and 0's to create dummy vectors for the three groups was followed (see Kerlinger and Pedhazur, 1973,p.105-07; Cohen and Cohen, 1983, p.183-93). The necessary and sufficient number of vectors to code group membership is equal to the number of groups or categories, minus one. So here our groups/categories are three (k=3). We need to create only two (k-1 or 3-1) vectors. They were named by type of school as TS-Girls, when the girls' schools were coded as '1'. Similarly, the type of school was named as TS-Boys when boys' schools were coded as '1'. Medium of instruction had a significant relationship with type of school (TS-Girls) $r=.59$ ($p<0.001$) and (TS-Boys) $r=.41$ ($p<0.001$).

The correlation between type of school (girls) and creativity (composite score) is negatively related ($r=-0.05$). This indicates that the girls schools' (coded as '1') mean score

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[5] Normally the sign of relationship (± r) indicates direction of the relationship. But with dummy variables indicates simply whether the mean of the present group (coded as '1') is larger (positive) or smaller (negative) than the mean of absent group (coded as '0') (see Cohen and Cohen, 1983, pp. 36 & 186)

is less than other schools (boys and co-educational schools coded as '0'). Similarly for boys' schools (coded as '1') the correlation 'r' is positive (0.03); therefore the mean score is better than other schools (girls' and co-educational, which are coded as '0'). The correlation between girls' and boys' schools is negative (-0.25) and significant at 0.001.

Table 10.15: Inter-correlations between organisational variables and creative thinking (N=373)

Variable	1 (MI)	2 (TS-Girls)	3 (TS-Boys)	4 (CT^+)
1. Medium of instruction (MI)	1.00	0.59***	0.41***	-0.12*
2. Type of school (TS-Girls)	-	1.00	-0.25***	-0.05#
3. Type of the school (TS-Boys))	-	-	1.00	0.03#
4. Creative thinking (composite scores- CT^+)				1.00

*** = Significant at 0.001 level * = Significant at 0.05 level # = Not Significant

This means that girls' schools are performing less well than boys' schools in developing creative thinking among their pupils. For details of the analysis see table-10.16.

10.4.1 The impact of medium of instruction on students creative thinking

The findings given in table 10.16 indicate that there were no significant mean differences between Telugu and English medium students on verbal originality. The t-values for verbal fluency, flexibility and total verbal creativity were found to be 3.75, 2.78 and 2.90 respectively. These were highly significant at 0.01 or beyond it. This indicates that the Telugu medium students performed better than the English medium students.

Table-10.16: Mean scores, SDs, SE_M and t-values for creative thinking of subjects (Ss) in relation to their medium of instruction

Creativity components	Medium (Coded)	N	Mean	SD	SE_M	t – values
Verbal Originality	Telugu (0)	202	50.82	9.68	0.68	1.72#
	English (1)	171	49.04	10.31	0.79	
Verbal Fluency	Telugu (0)	202	51.76	9.14	0.64	3.75***
	English (1)	171	47.93	10.60	0.81	
Verbal Flexibility	Telugu (0)	202	51.31	9.06	0.64	2.78**
	English (1)	171	48.45	10.83	0.83	
Total Verbal Creativity	Telugu (0)	202	153.89	26.14	1.84	2.90**
	English (1)	171	145.41	30.41	2.33	
Non-Verbal Originality	Telugu (0)	202	50.19	10.56	0.74	0.41#
	English (1)	171	49.77	9.33	0.71	
Non-verbal Elaboration	Telugu (0)	202	50.16	10.80	0.76	0.35#
	English (1)	171	49.80	9.00	0.69	
Total Non-verbal creativity	Telugu (0)	202	100.35	18.33	1.29	0.45#
	English (1)	171	99.57	14.32	1.10	
Composite Creativity (Verbal + Non-verbal)	Telugu (0)	202	254.24	36.97	2.60	2.40*
	English (1)	171	244.98	37.39	2.86	

*** = Significant at 0.001 ** = Significant at 0.01 * = Significant at 0.05 # Not significant

The same table also shows that the Telugu medium students seem to have the edge over their counterparts (English medium) with regard to their mean scores for non-verbal originality, elaboration and total non-verbal creativity. However, the mean difference is not statistically significant even at 0.05 level of confidence.

Finally, on composite creativity, the Telugu medium students were observed to be more creative in comparison to the English medium students ($t=2.40$; $p<0.05$).

The overall picture that emerged from the findings (table 10.16) with regard to the creativity of Telugu and English medium students suggests that English medium students are performing less well than their counterparts. This may be because they are handicapped in expressing their flow of ideas (fluency) and variety of ideas (flexibility). As far as uncommon or unique responses (originality) are concerned, they did not differ significantly on either verbal or non-verbal originality dimensions. This indicates that where students have a bilingual background the English medium students were less able to express their ideas fluently.

10.4.2 The influence of school type (gender) on students' creative thinking

Table10.17 shows no significant differences among the students from girls, boys and co-educational schools on verbal originality ($F=2.57$; $p> 0.05$) fluency ($F=1.06$; $p>0.05$), flexibility ($F=1.60$; $p>0.05$) or total verbal creativity ($F=1.61$;$p>0.05$). The differences in the means of verbal creativity scores of different type of school students' may be due to chance factor.

Non-significant differences were found in the mean scores for non-verbal originality ($F=2.32$; $p>0.05$) and total non-verbal creativity ($F=0.34$; $p>0.05$) among the girls', boys' and co-educational schools. A difference was found in non-verbal elaboration ($F=5.56$; $p<0.01$). Further analysis indicated that the mean scores were significantly higher for girls' schools in comparison to those of boys' and co-educational schools. However, a significant mean difference was found between girls' (G1) and boys' schools (G2) only.

Finally, in composite creativity, the obtained mean differences among the girls', boys and co-educational schools were not significant ($F=0.57$; $p>0.05$).

Further, of particular interest, is the analysis of data from girl students who are studying with boys in co-educational schools. This is important because many parents in India still hesitate to send girls to co-educational institutions. The reason could be either lack of female teachers or fears about lack of security in co-educational schools.

Table-10.17: Mean scores, SDs, SE_M and t-values for creative thinking of subjects (Ss) in relation to the type of the school.

Creativity components	Type of the School	N	Mean	SD	SE_M	F – ratio df= 2 / 370	Mean differences
Verbal originality	G1-Girls	111	48.91	10.97	1.04		
	G2-Boys	47	52.83	11.11	1.62		
	G3-Co-education	215	49.95	9.12	0.62	2.57#	
Verbal fluency	G1-Girls	111	48.85	10.95	1.04		
	G2-Boys	47	50.40	10.44	1.52	1.06#	
	G3-Co-education	215	50.51	9.37	0.64		
Verbal flexibility	G1-Girls	111	48.79	10.73	1.02		
	G2-Boys	47	51.76	10.97	1.60	1.60#	
	G3-Co-education	215	50.23	9.34	0.64		
Total verbal creativity	G1-Girls	111	146.55	31.03	2.95		
	G2-Boys	47	154.99	31.53	4.60	1.61#	
	G3-Co-education	215	150.69	26.20	1.79		
Non-verbal originality	G1-Girls	111	48.41	8.43	0.80		
	G2-Boys	47	51.72	9.19	1.34	2.32#	
	G3-Co-education	215	50.44	10.82	0.74		
Non-verbal elaboration	G1-Girls	111	52.08	8.65	0.82		G1
	G2-Boys	47	46.47	7.36	1.07	5.56**	G2 *
	G3-Co-education	215	49.69	10.90	0.74		
Total non-verbal creativity	G1-Girls	111	100.49	13.49	1.28		
	G2-Boys	47	98.19	13.80	2.01	0.34#	
	G3-Co-education	215	100.13	18.52	1.26		
Composite creativity (Verbal + non-verbal)	G1-Girls	111	247.04	38.35	3.64		
	G2-Boys	47	253.18	37.28	5.44	0.57#	
	G3-Co-education	215	250.82	37.00	2.52		

** = Significant at 0.01 # = Not significant

10.4.3 Comparison of girls in co-educational schools with those in girls' schools, and boys in boys' schools with those in co-educational schools.

From table 10.18, it is evident that there are no significant differences between girls from co-educational schools and pupils in other schools (boys', girls and boys in co-educational schools), on verbal originality (F=2.08; p>0.05), fluency (F=1.33; p>0.05), flexibility (1.33, p>0.05) and total verbal creativity (F=1.13; P> 0.05). Girls in co-educational schools perform as well as their counterparts in girls' schools in verbal creativity.

As for non-verbal originality and elaboration, the means of the four groups differed significantly at 0.05 level; the F-ratios were 3.42 and 3.70 respectively. But no difference on total non-verbal creativity was found (F=0.86; p<0.05).

Finally, on overall creativity the four groups' mean scores were not significantly different (F=0.41; p>0.05). However, girls in co-educational schools performed better than their counterparts in girls' schools. However, these differences were not significant. These

small differences may be due to the girls in co-educational schools coping better with classmates (male and female) and having good interpersonal relations with them, mixed staff (male and female); having fewer restrictions and impositions and more flexibility and freedom with teachers, parents and society. Particularly in Indian culture, girls have more constraints on their roles. For example, they must conform to social customs, there is discrimination between son and daughter, they are prevented from doing some types of tasks, there are strict limits on talking to male teachers or male students, and strict controls over girls' participation in out-of- school activities in the evenings or late at night, due to security problems. The evidence presented here suggests that co-education does not have a negative effect on girls' creativity.

Table-10.18: Mean scores, SDs, SE_M and F-values of Creative Thinking of subjects (Ss) in relation to the type of the school.

Creativity components	Type of the School	N	Mean	SD	SE_M	F – ratio df= 3 / 369	Mean differences
Verbal originality	Girls	111	48.91	10.97	1.04	$2.08^{\#}$	
	Boys	47	52.83	11.11	1.62		
	Girls in Co-education	115	49.28	8.62	0.80		
	Boys in Co-education	100	50.71	9.65	0.96		
Verbal fluency	Girls	111	48.85	10.95	1.04	$1.33^{\#}$	
	Boys	47	50.40	10.44	1.52		
	Girls in Co-education	115	51.38	9.31	0.86		
	Boys in Co-education	100	49.51	9.39	0.94		
Verbal flexibility	Girls	111	48.79	10.73	1.01	$1.33^{\#}$	
	Boys	47	51.76	10.97	1.60		
	Girls in Co-education	115	50.79	9.10	0.84		
	Boys in Co-education	100	49.58	9.62	0.96		
Total verbal creativity	Girls	111	146.55	31.03	2.95	$1.13^{\#}$	
	Boys	47	154.99	31.53	4.60		
	Girls in Co-education	115	151.46	25.30	2.36		
	Boys in Co-education	100	149.81	27.30	2.73		
Non-verbal originality	Girls	111	48.41	8.43	0.80	3.42*	G1
	Boys	47	51.71	9.19	1.34		
	Girls in Co-education	115	48.96	9.87	0.92		
	Boys in Co-education	100	52.15	11.63	1.16		G4 *
Non-verbal elaboration	Girls	111	52.08	8.65	0.82	3.70*	G1
	Boys	47	46.47	7.36	1.07		G2 *
	Girls in Co-education	115	49.72	9.74	0.91		
	Boys in Co-education	100	49.66	12.15	1.22		
Total non-verbal creativity	Girls	111	100.49	13.49	1.28	$0.86^{\#}$	
	Boys	47	98.19	13.80	2.01		
	Girls in Co-education	115	98.68	16.34	1.52		
	Boys in Co-education	100	101.81	20.72	2.07		
Composite creativity (Verbal + non-verbal)	Girls	111	247.04	38.35	3.64	$0.41^{\#}$	
	Boys	47	253.18	37.28	5.44		
	Girls in Co-education	115	250.13	35.20	3.28		
	Boys in Co-education	100	251.61	39.13	3.91		

* = Significant at 0.05 # Not significant

10.5.0 Cognitive and motivational factors and students creativity

The students were asked to write down any three school subjects[6] that they liked, any three subjects that they disliked, and any three careers they would prefer. They were also asked to give reasons for their preferences. Lastly, they were asked to write about their good and bad experiences in the classroom (see Appendix B3). These responses given by the students were 'multiple' and qualitative. No statistical treatment was given to the data except to categorise it and give percentages.

10.5.1 Levels of students' creativity –subjects which students liked

Table 10.19 gives the six subjects most commonly available as curriculum subjects at secondary school level in Andhra Pradesh as well as in India. For the purpose of comparison, the sample was classified into three groups[7] ; they were labelled as High Creative (HC), Average Creative (AC) and Low Creative (LC), on the basis of composite test scores on the tests of creative thinking.

Table 10-19: Academic subjects liked by students, with their level of creative thinking

Subject (Coded)	Level of creative thinking			Total
	High	Average	Low	
	f %	f %	f %	f %
1. Telugu (1)	28 (45.2)	**129 (52.2)**	**30 (47.6)**	**187 (50.3)**
2. Hindi (2)	23 (37.1)	**125 (50.6)**	**35 (55.6)**	**183 (49.2)**
3. English (3)	**40 (64.5)**	**146 (59.1)**	**40 (63.5)**	**226 (60.8)**
4. Mathematics (4)	**32 (51.6)**	117 (47.4)	25 (39.7)	174 (46.8)
5. Science** (5)	**33 (53.2)**	86 (34.8)	20 (31.7)	139 (37.4)
6. Social Studies (6)	30 (48.4)	113 (45.7)	28 (44.4)	171 (46.0)
Total multiple responses	186	716	178	1080
Total Valid cases	62	247	63	372

Note: Percentages within brackets were calculated on the basis of total valid cases but not on total multiple responses

** Includes Bio-Sciences and Physical Sciences

The students (N=373) were asked to name any three school subjects which they liked. The expected possible multiple responses were (373 X 3=1119), but due to some non-responses a total of 1080 (96.5%) multiple responses emerged. The percentages within the brackets in the table were calculated for each column, considering the valid cases but not the multiple responses (see table 10.19). Students were also asked to explain the

[6] There are a total of six subjects at secondary level. They are 1. Telugu 2. Hindi 3. English 4. Mathematics 5. Sciences (Physical + Biological) 6. Social studies.

reasons why they liked each particular subject. The reasons given for choosing individual subjects were collected under the same question (see App-B3, Q.No. 12(1)). The multiple responses were broken down in respect of sub-samples (called groups) and are presented in the tables E2-T1, E2-T2 & E3-T3 (see Appendix E2).

In terms of subjects most liked overall (N=373), first, the subject of English language showed a high degree of agreement (60.8%); second, Telugu (50.3%); followed by Hindi (49.2%). There is an interesting observation within the data that all three groups, HC, AC and LC liked English; the percentages were 64.5, 59.1 and 63.5% respectively.

The most striking differences in liking subjects were found between the HC group and rest of the groups (AC and LC, including total sample). The HC group liked Science (53.2%) and Mathematics (51.6%); the AC group liked Telugu (52.2%) and Hindi (50.6%); the LC group liked Hindi (55.6%) and Telugu (47.6).

The common reasons given by all the groups for liking English were: "interesting teaching", "lessons easy to understand", and "interesting stories" (see APP-E2, table-E2-T1). Exclusive reasons given by the HC group, compared with the LC group, were: "using new words", "it is an international language", "introduced by the British", "helpful in higher education", and "can be used in future life / daily life".

Table E2 –T2 (in APP. E2) breaks down the reasons given by the High Creative (HC) group for liking Science and Mathematics. The frequency (f) shows the number of times each kind of response was given. The higher percentages of reasons (frequencies) for liking Science given by the HC group were: "to become a doctor", "there are interesting experiments and discoveries", "one learns about living beings", "understanding nature / environment", "interesting teaching", "learning about the history of scientists and inventions", "opening the door to new knowledge".

Similarly, the reasons for liking mathematics given by the HC group were: "finding solutions to the problems gives enjoyment, creates interest and enthusiasm", "subject lessons are easy to understand", "it is easy to learn, it is full of fun", "full of formulas and symbols", and "interesting teaching" (see table-E2-T2 in App-E2).

The reasons given by the Low Creative (LC) group for liking Telugu and Hindi are presented in table E2-T3 (APP. E2). The common reasons mentioned for both subjects

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[7] The High Creative (HC) group (N=62) composed those scored above Mean +1 SD (250+37.4=287.4); the Low creative (LC) group (N=63) those scored below Mean-1SD (250-37.4=212.6) ; and the Average Creative (AC) group (N=247) those scored between Mean-1SD and Mean+1SD (212.6 to 287.4)

were: "it is our mother tongue / communicative language", "subject lessons are easy to understand", "we are able to read", "it has very interesting stories" and "teachers teach interestingly". In addition, the LC group considered Hindi as enjoyable because it is easy to learn, and they think that Telugu has interesting poetry.

There were some differences between the different creative groups regarding their reasons for liking subjects, but overall liking a subject depends upon understanding it and the teacher teaching interestingly.

10.5.2 Levels of students' creativity –subjects disliked

The students (N=373) were asked to name any three subjects they disliked and were also asked to give the reasons why they disliked that particular subject (see App-B3, Q.No. 12(2)). Table-10.20 provides the details.

Table -10.20: Academic subjects disliked by students, with their level of creative thinking

Subjects (Coded)	Level of creative thinking			Total
	High	Average	Low	
	f %	f %	f %	f %
1. Telugu (1)	**29 (49.2)**	95 (40.7)	24 (40.7)	148 (41.9)
2 Hindi (2)	**30 (50.8)**	98 (41.7)	23 (39.0)	151 (42.8)
3 English (3)	17 (28.8)	82 (34.9)	22 (37.3)	121 (34.3)
4 Mathematics (4)	27 (45.8)	**117 (49.8)**	**33 (55.9)**	**177 (50.1)**
5 Science* (5)	25 (42.5)	**145 (61.7)**	**39 (66.1)**	**209 (59.2)**
6 Social Studies (6)	**28 (47.5)**	**107 (45.5)**	**25 (42.4)**	**160 (45.3)**
Total multiple responses	156	644	166	966
Total valid cases	59	235	59	353

Note: Percentages within brackets were calculated on the basis of total valid cases but not on total multiple responses

*** includes bio-sciences and physical sciences**

In general, the subjects disliked by the whole sample (N=373), were first, science (59.2%); second, mathematics (50.1%); lastly social studies (45.3%).

Disparities were found in disliking subjects between the High Creative (HC) and the Average Creative (AC) and Low Creative (LC) groups. The HC group disliked Hindi (50.8%) and Telugu (49.2%); the AC group disliked Science (61.7%) and Mathematics (49.8%) as did the LC group Science (66.1%) and Mathematics (55.9%).

There is an important observation that Social Studies was disliked by all three groups HC, AC and LC; their percentages were 47.5, 45.5 and 42.4 respectively. The main reasons for disliking Social Studies were: "no interest in a subject", "it is a boring subject", "it is hard to learn", "I can't understand the subject", "teachers do not teach it well",

"lengthy answers are required" and "it is difficult to remember the years" (see table E2-T4 in Appendix E2).

The exclusive reasons given by the HC group compared to the LC group were: "don't like history, "don't like politics", and "geography".

Table E2-T5 (App. E2) breaks down the reasons given by the HC group for disliking the subjects Hindi and Telugu. The most common reasons were "no interest" and "can't understand the subject". Besides these, other particular reasons given for disliking Hindi were: "the problem of reading", "it is not my mother tongue" and "it is not an important subject nowadays". Similarly, the reasons for disliking Telugu were: a "dislike of poetry", "it is a difficult subject", "there is so much grammar", and "a lack of interest in knowing the language".

The reasons given by the Low Creative (LC) group for disliking Science and Mathematics are presented in table E2-T6 (in APP. E2). The common reasons disclosed were: "can't understand the subject", "no interest in the subject", "the sums are difficult" and "the teachers do not teach it well". Besides these, one of the reasons given for Science was that "it was hard to learn".

Though differences were found in the reasons given by the three creative groups, the main reasons for disliking subjects were "lack of understanding of the subject" and "no interest in the subject".

10.5.3 Level of students' creativity –Occupation chosen

The students were asked to indicate three future occupational choices on the Students Information Sheet (SIS). With the data collected through SIS, the researcher was able to examine, first, the extent to which the sample as a whole, aspired to different kinds of occupation; and secondly, to compare the three groups: High Creative (HC), Average Creative (AC) and Low Creative (LC).

A wide range of occupations was chosen by the whole sample (N=373). They are presented in Table 10.21. A high percentage of pupils chose two occupations: Doctor (66.4%) and Teacher (55.6%); followed by Lawyer (17.4%), Engineer (16.8%) and Police Constable (15.4%). A smaller percentage chose Business (8.8%), Army Officer (5.5%) and Nurse (5.2%).

When comparing the three groups (HC, AC and LC) it is evident from the analysis that each group had similar aspirations. The top five occupations (> 10%) chosen by all

three groups, were the same, even maintaining the rank order. The occupations (with ranks) were: Doctor (1), Teacher (2), Lawyer (3 or 3.5 for HC), Engineer (4 or 3.5 for HC) and Police Constable (5).

Table-10.21: Students Occupational choices by their level of creative thinking

Jobs liked by the students (Coded)	Level of creative thinking			Total
	High	Average	Low	f (%)
1.0 Production and Transport operators (1)				
1.1 Bookbinder	-	1 (0.4)	-	1 (0.3)
1.2 Screen printing	1 (1.6)	1 (0.4)	-	2 (0.6)
1.3 Driver	-	4 (1.6)	2 (3.4)	6 (1.7)
1.4 Tailor	2 (3.2)	7 (2.9)	2 (3.4)	11 (3.0)
2.0 Farmers, Fisherman and related workers (2)				
2.1 Farmer	-	2 (0.8)	1 (1.7)	3 (0.8)
3.0 Service workers (3)				
3.1 Police Sub-Inspector	2 (3.2)	8 (3.3)	-	10 (2.8)
3.2 Police Constable	**7 (11.3)**	**36 (14.8)**	**13 (22.4)**	**56 (15.4)**
3.3 CID	-	3 (1.2)	-	3 (0.8)
3.4 Customs officer	-	1 (0.4)	-	1 (0.3)
3.5 Nurse	4 (6.5)	13 (5.3)	2 (3.4)	**19 (5.2)**
3.6 Air hostess	1 (1.6)	1 (0.4)	-	2 (0.6)
3.7 Watchmen / Gatekeeper	-	1 (0.4)	-	1 (0.3)
4.0 Sales workers (4)				
4.1 Newspaper agent	-	-	1 (1.7)	1 (0.3)
4.2 Milkman	-	-	1 (1.7)	1 (0.3)
4.3 Business	**5 (8.1)**	**21 (8.6)**	**6 (10.3)**	**32 (8.8)**
5.0 Clerical and related workers (5)				
5.1 Accountant	-	1 (0.4)	1 (1.7)	2 (0.6)
5.2 Receptionist	-	1 (0.4)	-	1 (0.3)
5.3 Typist	-	8 (3.3)	2 (3.4)	10 (2.8)
5.4 Bus Conductor	-	1 (0.4)	1 (1.7)	2 (0.6)
5.5 Office Messenger	-	2 (0.8)	1 (1.7)	3 (0.8)
6.0 Administrative, executive and managerial workers (6)				
6.1 District Collector	4 (6.5)	10 (4.1)	-	14 (3.9)
6.2 Factory Manager	-	1 (0.4)	-	1 (0.3)
6.3 Bank Manager	-	2 (0.8)	-	2 (0.6)
6.4 Income Tax Officer	1 (1.6)	-	-	1 (0.3)
6.5 Administrative & Executive Officer	1 (1.6)	1 (0.4)	1 (1.7)	3 (0.8)
7.1 Professional, Technical and related workers (7)				
7. 1 Doctor	**41 (66.1)**	**160 (65.8)**	**40 (69.0)**	**241 (66.4)**
7. 2 Teacher	**33 (53.2)**	**144 (59.3)**	**25 (43.1)**	**202 (55.6)**
7. 3 Lecturer	-	2 (0.8)	-	2 (0.6)
7. 4 Scientist	3 (4.8)	5 (2.1)	-	8 (2.2)
7. 5 Judge	-	1 (0.4)	1 (1.7)	2 (0.6)
7. 6 Lawyer	**11 (17.7)**	**42 (17.3)**	**10 (17.2)**	**63 (17.4)**
7. 7 Army Officer	4 (6.5)	16 (6.6)	-	**20 (5.5)**
7. 8 Sports Coach	-	1 (0.4)	-	1 (0.3)
7. 9 Political Leader	3 (4.8)	3 (1.2)	-	6 (1.7)
7.10 Charity Worker	1 (1.6)	2 (0.8)	-	3 (0.8)
7.11 Chartered accountant	-	2 (0.8)	-	2 (0.6)
7.12 Artist	-	3 (1.2)	-	3 (0.8)
7.13 Engineer	**11 (17.7)**	**41 (16.9)**	**9 (15.5)**	**61 (16.8)**
7.14 Pilot	7 (11.3)	8 (3.3)	-	15 (4.1)
7.15 Airforce Officer	-	4 (1.6)	-	4 (1.1)
7.16 Navy Officer	-	1 (0.4)	-	1 (0.3)
7.17 Computer Professional	2 (3.2)	4 (1.6)	-	6 (1.7)
7.18 Mechanic	-	4 (1.6)	1 (1.7)	5 (1.4)
7.19 Electrician	-	4 (1.6)	2.(3.4)	6 (1.7)
7.20 Technician	2 (3.2)	-	-	2 (0.6)
Total multiple responses	146	573	122	841
Total valid cases	62	243	58	363

Note: Percentages within that brackets were calculated on the basis of total valid cases but not on total multiple responses

Exclusive and specific occupations chosen by the HC group when compared to the LC group were: Pilot (11.3%), District Collector (6.5%), Army Officer (6.5%), Scientist (4.8%), Political Leader (4.8%), Computer Professional (3.2%), Technician (3.2%) and Sub-Inspector of Police (3.2%). A very small percentage of HC students chose the occupations of Air hostess, Charity Worker and Screen-printing.

The qualitative data was analysed (see Table E2-T7 in Appendix E2), as were the reasons given for choosing individual occupations, with reference to the whole sample (N=373) first, followed by the three sub-sample groups (HC, AC and LC). The most common reasons given by the whole sample and all three groups (HC, AC and LC) for liking the occupation of Doctor were: to treat poor patients, serve poor people and having this ambition from childhood. Besides these, exclusive reasons given by the HC group when compared to the LC group were to 'defend the nation', 'liking science subjects' and 'a good job for me'.

Common reasons given for choosing Teaching by the whole sample and the three groups (HC, AC and LC) were: 'liking to teach students', 'educating the illiterate and poor', 'guiding students', 'teaching students well' and 'enjoying being with children'. A small percentage of the HC group gave specific and rare reasons compared to LC group. They were: 'to develop the country', to 'eradicate illiteracy', 'it is easy to get this job', 'it is a unusual job in the world', and 'it is my parents' ambition'.

The top reasons for liking the occupation of Lawyer given by the whole sample (N= 373) and the three groups (HC, AC and LC) were to provide justice for poor people and to serve poor people. A specific and high percentage of HC group mentioned, 'to maintain law and order', and a small percentage said, 'to punish criminals'.

The whole sample and the three groups (HC, AC and LC) perceived being a police constable favourably because it enabled them 'to catch thieves', 'defend the nation' and to 'punish criminals'. The reasons given for liking an Engineering career by the whole sample (N= 373) and the three groups were: 'planning & designing buildings and bridges', 'to earn a lot of money', and 'it is a good job for me'. A specific reason given by HC group was 'liking the subject like mathematics'.

10.5.4 Levels of students' creativity –good classroom experiences

The students were asked to write about their good experiences in the classroom. From this open-ended question, 332 multiple responses emerged. These responses were

tabulated in the form of frequencies under five categories: teacher-student relationship, students' interpersonal relationships, students' achievements, extra-curricular activities and no good experiences. These are presented in Table 10.22 in relation to the level of students' creativity (HC, AC and LC). The percentages within the brackets were calculated on the basis of valid cases in each group (High Creative (N=51), Average Creative (N=207), and Low Creative (N=31)).

Table- 10.22: Students' good experiences in the classroom in relation to their level of creative thinking

Sno	Students' good experiences in the classroom	Level of creative thinking			Total
		High f (%)	Average f (%)	Low f (%)	f (%)
1.0	**Teacher –student relationship**				
	When				
1. 1	⇨ Interesting tasks given by the teacher☺	3 (5.9)	7 (3.4)	2 (6.5)	12 (4.2)
1. 2	⇨ Praise by the teacher for getting good marks	-	8 (3.9)	-	8 (2.8)
1. 3	⇨ Praise by the teacher for daily homework	1 (2.0)	2 (1.0)	-	3 (1.0)
1. 4	⇨ Praise by the teacher for good reading and writing	-	4 (1.9)	-	4 (1.4)
1. 5	⇨ Teacher appreciation for correct answers	3 (5.9)	12 (5.6	1 (3.2)	16 (5.5)
1. 6	⇨ Teacher appreciation for good discipline	1 (2.0)	5 (2.4)	-	6 (2.1)
1. 7	⇨ Teacher taught study habits	3 (5.9)	1 (0.5)	1 (3.2)	5 (1.7)
1. 8	⇨ Teachers taking regular classes	1 (2.0)	5 (2.4)	-	6 (2.1)
1. 9	⇨ Teachers are teaching well	6 (11.8)	15 (7.2)	1 (3.2)	22 (7.6)
1.10	⇨ Teachers are humorous	5 (9.8)	8 (3.9)	2 (6.5)	15 (5.2)
1.11	⇨ Teachers are not scolding	-	2 (1.0)	1 (3.2)	3 (1.0)
1.12	⇨ Teachers show experiments	2 (3.9)	-	-	2 (0.7)
2.0	**Students' interpersonal relationships**				
2. 1	⇨ Happy when classmates are friendly & co-operative	10 (19.6)	25 (12.1)	1 (3.2)	36 (12.5)
2. 2	⇨ Classmates have good habits	-	14 (6.8)	1 (3.2)	15 (5.2)
2. 3	⇨ Play games with friends	1 (2.0)	8 (3.9)	-	9 (3.1)
2. 4	⇨ Elected as a class leader	2 (3.9)	-	-	2 (0.7)
2. 5	⇨ Jokes & stories are told by the students	-	2 (1.0)	-	2 (0.7)
2. 6	⇨ Encouragement given by friends	2 (3.9)	-	-	2 (0.7)
2. 7	⇨ Classroom entertainment in the absence of the teacher	-	2 (1.0)	2 (6.5)	4 (1.4)
3.0	**Students' Achievements**				
3.1	⇨ Get good marks	14 (27.5)	65 (31.4)	11 (35.5)	90 (31.1)
3.2	⇨ Get certificates / prizes	5 (9.5)	15 (7.2)	2 (6.5)	22 (7.6)
3.3	⇨ Wrote examinations well	-	1 (0.5)	-	1 (0.3)
4.0	**Extra-curricular activities**				
4.1	⇨ Going to picnic / excursion / N.C.C. camps	2 (3.9)	8 (3.9)	-	10 (3.5)
4.2	⇨ Organised cultural activities in school	-	2 (1.0)	-	2 (0.7)
4.3	⇨ Participated in quiz programmes	1 (2.0)	-	-	1 (0.3)
4.4	⇨ I sing a song in classroom	-	1 (0.5)	-	1 (0.3)
4.5	⇨ Celebration of national festival	4 (7.8)	18 (8.7)	8 (25.8)	30 (10.4)
5.0	**No good experiences**	-	3 (1.4)	-	3 (1.0)
	Total multiple responses	66	233	33	332
	Total valid cases	51 (100)	207(100)	31 (100)	289(100)

☺ Songs, Jokes, GK questions, Problem solving

Note: Percentages within brackets were calculated on the basis of total valid cases but not on total multiple responses

Form Table-10.22, it is clear that 99% of students have had good experiences in their classrooms. The experiences were related to academic as well as non-academic activities. A high percentage of students as a whole, and the three sub groups (HC, AC and LC), described good experiences in their classroom as "getting good marks", "happiness when classmates are friendly & co-operative", a "celebration of national festivals", "getting certificates or prizes", "when teachers are teaching well", "when teachers are humorous" and "receiving teachers' appreciation for correct answers".

It is worth noting the specific and unique experiences of the HC group when compared to the LC group. The experiences were: when teachers demonstrate experiments, going on picnics, excursions or NCC camps, when encouragement is given by friends, when elected as class leader. Small percentage responses of the HC group experiences were: praise by the teacher for daily homework, playing with friends, teacher appreciation for good discipline, teachers taking regular classes, and participation in quiz programmes.

This indicates that there is a lot of pressure on all groups to obtain 'good marks'. The percentage for HC (27.5%) is less than for AC (31.4%) and LC (35.5%). There is little emphasis on the spirit of enquiry or scientific temperament; they are 'addicted' to school; achievement. This was their main goal and purpose of school life. Their main aim was to get good marks rather than acquire special or real skills, interests and knowledge.

10.5.5 Levels of students' creativity –bad classroom experiences

Table 10.23 indicates that 96.2% of the students had had bad experiences in the classroom. When the students were asked to report on their bad experiences in the classroom, a total of 375 multiple responses for this open-ended question emerged. They were classified under six categories in the form of frequencies. The main categories were: teacher-student relationship, students' interpersonal relationships, students' failures, extra-curricular activities, classroom climate and no bad experiences.

A high percentage of students as a whole (N=373) and from the three groups (HC, AC and LC) expressed their common bad experiences in the classroom as 'not getting good marks in exams'. This clearly again indicates a strong feeling of the importance of 'academic marks' among the students. Other bad experiences were students' misbehaviour in the classroom, indiscipline, corporal and other punishment for indiscipline, teachers scolding for indiscipline, unhappiness when classmates were not friendly or co-operative and not getting certificates or prizes.

Table- 10.23: Students' bad experiences in the classroom in relation to their level of creative thinking

SNo	Students' bad experiences in the classroom	Level of creative thinking			Total
		High f (%)	Average f (%)	Low f (%)	f (%)
1.0	**Teacher –student relationships**				
	*Corporal and other punishments**				
1. 1	⇨ for in-discipline	10 (17.5)	19 (9.3)	2 (6.7)	31 (10.6
1. 2	⇨ for not doing home work	-	8 (3.9)	1 (3.3)	9 (3.1)
1. 3	⇨ for less marks in exams	-	1 (0.5)	-	1 (0.3)
1. 4	⇨ for not giving correct answers	1 (1.8)	-	-	1 (0.3)
1. 5	⇨ for poor reading and writing	-	1 (0.5)	-	1 (0.3)
	Teachers				
1. 6	⇨ scolding for indiscipline	3 (5.3)	23 (11.2)	2 (6.7)	28 (9.6)
1. 7	⇨ scolding for not doing homework	1 (1.8)	8 (3.9)	-	9 (3.1)
1. 8	⇨ scolding for less marks in exams	-	6 (2.9)	2 (6.7)	8 (2.7)
1. 9	⇨ scolding for not giving correct answers	-	1 (0.5)	-	1 (0.3)
1.10	⇨ get angry + and insult in the classroom	-	3 (1.5)	1 (3.3)	4 (1.4)
1.11	⇨ leave the school −	3 (5.3)	4 (2.0)	-	7 (2.4)
1.12	⇨ are not teaching well	1 (1.8)	3 (1.5)	-	4 (1.4)
1.13	⇨ appreciate only intelligent students	1 (1.8)	3 (1.5)	-	4 (1.4)
1.14	⇨ sleeping in the classroom	-	2 (1.0)	-	2 (0.7)
1.15	⇨ give more homework	1(1.8)	4 (2.0)	2 (6.7)	7 (2.4)
2.0	**Students interpersonal relationships**				
	Unhappy when				
2. 1	⇨ Classmates are not friendly / co-operative	8 (14.0)	17 (8.3	2 (6.7)	27 (9.2)
2. 2	⇨ friends suspecting	1 (1.8)	1 (0.5)	-	2 (0.7)
2. 3	Friends leave the school =	1 (1.8)	3 (1.5)	-	4 (1.4)
2. 4	Friends are jealousy	2 (3.5)	1 (0.5)	-	3 (1.0)
2. 5	Friends quarrel and get separated	6 (10.5)	10 (4.9)	-	16 (5.5)
2. 6	Insulted by friends	-	2 (1.0)	-	2 (0.7)
2. 7	Students misbehave☹ in the classroom	8 (14.0)	39 (19.0)	1 (3.3)	48 (16.4)
2. 8	Students misbehave with teachers	-	3 (1.5)	1 (3.3)	4 (1.4)
2. 9	Students misbehave♠ with other students	2 (3.5)	7 (3.4)	2 (6.7)	11 (3.8)
2.10	Class leader domination and partiality	3 (5.3)	5 (2.4)	1 (3.3)	9 (3.1)
3.0	**Students' failures**				
3.1	Guilty feeling for poor performance	-	4 (2.0)	1 (3.3)	5 (1.7)
3.2	Not getting good marks in exams	5 (8.8)	40 (19.5)	7 (23.3)	52 (17.8)
3.3	Failed in some subjects	-	1 (0.5)	-	1 (0.3)
3.4	Not get ting certificates / prizes	2 (3.5)	9 (4.4)	4 (13.3)	15 (5.1)
4.0	**Co-curricular activities**				
4.1	No proper games (eg. Cricket , Hockey etc.,)	1 (1.8)	1 (0.5)	1 (3.3)	3 (1.0)
5.0	**Classroom climate**				
5.1	Indiscipline in the class	8 (14.0)	22 (10.7)	2 (6.7)	32 (11.0)
5.2	Can't understand lesson	2 (3.5)	4 (2.0)	1 (3.3)	7 (2.4)
5.3	No regular classes	2 (3.5)	4 (2.0)	-	6 (2.1)
6.0	**6. No bad experience**	1 (1.8)	9 (4.4)	1 (3.3)	11 (3.8)
	Total multiple responses	73	268	34	375
	Total Valid cases	57 (100)	205 (100)	30 (100)	292(100)

Note: Percentages within that brackets were calculated on the basis of total valid cases but not on total multiple responses

* Standing on bench or outside the class, running round the play ground etc.,

\+ For grammatical mistakes and irregular attendance

\- Teachers transferred / retired / expired / sick.

= Friends transferred to other school or left the school

☹ Fighting, shouting, quarrelling, talking while teacher teaching.

♠ Teasing or beating

Besides the above, it is most important to examine the specific bad experiences of High Creative children in the classroom when compared to the Low Creative children. High creative group students have had bad experiences when friends quarrel and are separated, teachers leave the school, there are no regular classes, friends are jealous, teachers do not teach well, appreciate only intelligent students, corporal and other punishment is given for not giving correct answers and teachers scold for not doing homework.

10.6.0 Summary

This chapter has explored the factors affecting measured creativity in the students and how different levels of creativity affect students' perceptions of school subjects and future occupations. The findings showed no overall gender differences in creativity, though there were fluctuations with age. Overall creativity scores were related to children's parental background, with better education, occupation and income leading to higher levels of creativity. When parents were considered separately there were exceptions. The children of illiterate fathers seemed to score more highly than those with more education. Why this might be so is not clear. With regard to the mother, the better educated the mother the higher the level of verbal creativity. This did not apply to non-verbal creativity. Fathers' occupation did not influence creativity, but for mothers, where higher levels of occupations were held, children tended to have better verbal creativity. Similarly was the mother's income, not the father's which differentiated verbal but not non-verbal creativity.

The school factors explored showed that girls' schools were less successful overall in developing creativity. Girls in co-educational schools performed in a similar manner to girls in separate schools. The medium of instruction had a profound influence on creativity scores. Telugu medium students performed better, perhaps because they could more easily express themselves in Telugu.

There was a tendency for students to prefer classes in English rather than mathematics and science, but there were differences between high, average and low creative groups. The higher creative group preferred mathematics and science more than the lower creative groups. The reasons given for liking subjects often related to the quality of the teaching and the degree of understanding of the student, i.e. whether the subject was perceived as difficult. In relation to occupation selection, preferred professions were high

status, eg. doctor, teacher, lawyer and engineer. This was true across all groups. There was considerable variety in the reasons given, from altruistic ones to financial.

Classroom experiences, good and bad, tended to focus very much on the achievements of students in tests and examinations, although there were some differences between HC, AC and LC groups. The high creative groups were more concerned with teaching quality and the atmosphere in the classroom.

Chapter XI

Data Analysis of the Teacher Encouragement Scale and School Activities

11.0 Introduction

In this present chapter, the data results are discussed in three sections. Section I deals with the analysis of the Teacher Encouragement scale (TES). In this section the sample distribution for TES will be presented first, followed by the analysis of TES items, nature of the distribution of TES scores, factor analysis of TES, and analysis of TES in relation to selected variables i.e. sex, medium of instruction, type of school (boys or girls) and the three levels of students' creativity. Section II deals with activities organised by schools as a whole to promote creativity, and in section III an attempt has been to explore the relationship between creative thinking and some of its correlates.

11.1 The Sample distribution for TES

In class 9, the student's age would normally vary from 13 to 15 years (see Chapter VIII, table 8.2). Research has shown that students in this age group are better judges in rating their teachers' behaviour in the classroom than outside observers (Naidu, 1987). As the students meet their subject teacher daily, they also know the merits and demerits of each and every subject teacher; and the behaviour patterns and interactive processes of these teachers in classroom situations.

A total of 373 IX class students were asked to rate their teachers. Table-11.1 explains the school and subject sample distribution. The entire range of subject teachers in the schools was covered. The percentage of subject teachers ranged from 11.8% to 16.4%.

Table-11.1: The distribution of students by school and taught subjects.

School	Telugu	Hindi	English	Maths	BS	PS	SS	Total	%
1	6	4	6	6	6	-	7	35	(9.4)
2	9	8	8	9	8	-	9	51	(13.7)
3	4	7	6	7	8	7	5	44	(11.8)
4	6	6	6	6	7	7	7	45	(12.1)
5	5	5	5	4	2	4	5	30	(8.0)
6	5	5	8	8	7	6	6	45	(12.1)
7	6	7	3	5	3	5	3	32	(8.6)
8	11	-	6	11	7	6	6	47	(12.6)
9	3	2	4	5	8	14	8	44	(11.8)
Total	55 (14.7)	44 (11.8)	52 (13.9)	61 (16.4)	56 (15.0)	49 (13.1)	56 (15.0)	373	(100.0)

BS = Biological Sciences PS= Physical Sciences SS= Social Studies

11.2 Analysis of TES items

The frequencies, X^2 values, Mean and SDs of each item of the TES are presented in Table 11.2. The X^2 values indicate that all the items are significant (beyond the 0.001) level, except item 4 (which is significant at 0.01 level). The item means range from 1.19 to 3.22, while SDs range from 1.22 to 1.49. Item 9, 'Does the teacher criticise you for no good reason in the classroom?' has the highest mean; while the second highest mean item is 13, 'Do you trust the teacher?'. The items with lowest and second lowest means are item 18, 'Does the teacher encourage you to discus things in groups?' and item 22, 'Are the students' ideas/suggestions used during classroom discussion?'

Table-11.2: The Itemwise responses for the Teacher Encouragement scale (TES).

Q.No	N	S	O	U	A	TOTAL	X^2 (df=4)	Mean	SD
+1	23	134	30	45	141	373	180.5 $^{\psi}$	2.39	1.45
+2	24	101	41	90	117	373	86.1$^{\psi}$	2.47	1.35
+3	97	99	52	68	55	371	27.4$^{\psi}$	1.69	1.41
+4	72	100	73	69	56	370	13.9$^{£}$	1.83	1.35
+5	-	-	-	-	-	-	-	-	-
-6	200	79	38	28	28	373	287.2$^{\psi}$	3.06	1.27
-7	191	79	27	37	37	371	251.5$^{\psi}$	2.94	1.37
+8	39	102	35	75	119	370	75.1$^{\psi}$	2.36	1.44
-9	234	54	36	29	20	373	434.1$^{\psi}$	3.22	1.22
+10	46	49	36	47	194	372	241.7$^{\psi}$	2.79	1.49
+11	43	104	39	53	132	371	92.9$^{\psi}$	2.34	1.48
+12	49	145	42	74	60	370	93.1$^{\psi}$	1.87	1.33
+13	20	49	26	40	234	369	441.8$^{\psi}$	3.14	1.31
-14	65	130	41	69	65	370	59.6$^{\psi}$	2.17	1.39
-15	191	72	32	42	28	365	254.7$^{\psi}$	2.98	1.33
+16	45	65	44	82	129	365	67.2$^{\psi}$	2.51	1.44
+17	35	127	40	44	125	371	121.1$^{\psi}$	2.26	1.46
+18	154	103	40	36	38	371	150.1$^{\psi}$	1.19	1.34
+19	41	73	35	68	154	371	121.9$^{\psi}$	2.60	1.46
+20	60	148	38	73	51	370	101.3$^{\psi}$	1.75	1.32
+21	-	-	-	-	-	-	-	-	-
+22	83	133	51	53	52	372	67.4$^{\psi}$	1.62	1.35

+ = Positive items - = Negative items

ψ = Significant at 0.0001 level. £ = Significant at 0.01 level

11.3 Nature of the distribution of TES Scores

The TES consists of 20 items; each item statement is anchored with a 5-point scale 'Always', 'Usually', 'Often', 'Sometimes', and 'Never'. The positive items (1, 2, 3, 4, 8, 10, 11, 12, 13, 16, 17, 18, 19, 20, 22) were responded to in the order 4,3,2,1, and 0; the negative items (6,7,9,14,15) were responded to in the reverse order, 0,1,2,3, and 4. The highest possible score that could be obtained is 80 and the lowest possible score is 0.

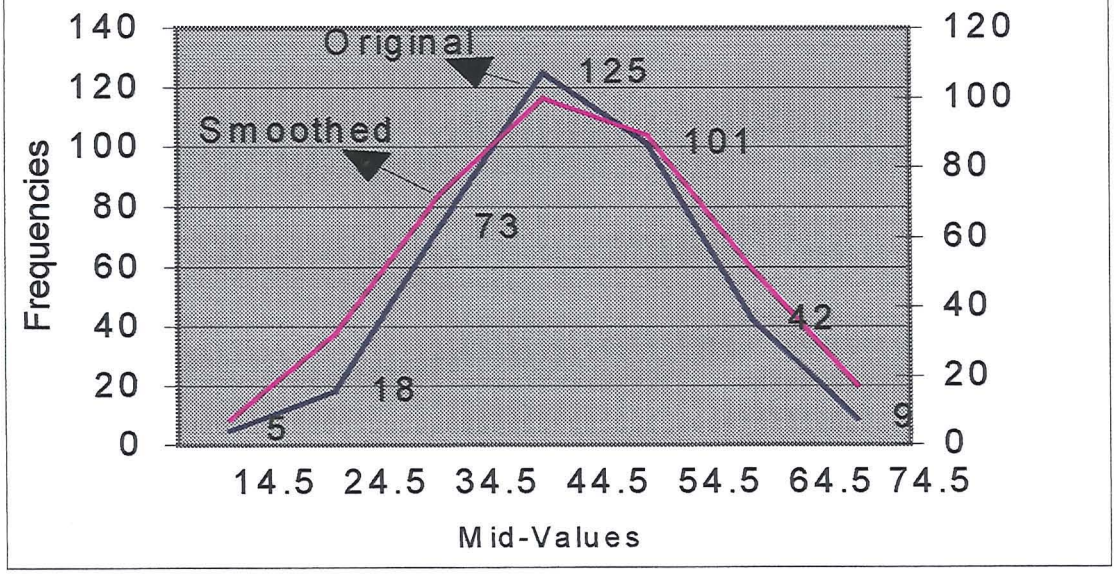
For the purpose of statistical analysis the data were grouped. The scores obtained for the 373 pupils of standard IX who marked the TES are presented in the form of a frequency distribution in Table-11.3.

Table-11.3: Frequency distribution and descriptive statistics of TES

Class Interval	Frequency (f)	Cumulative (f)	Smooth frequency	Descriptive Statistics	
10-19	5	5	7.7	Mean = 46.86	Minimum = 14
20-29	18	23	32.0	Median = 46.00	Maximum = 75
30-39	73	96	72.0	Mode = 42.00	Range = 61
40-49	125	221	99.7	SD = 11.40	Skewness= -.03
50-59	101	322	89.3	Variance = 129.96	Kurtosis = -.14
60-69	42	364	50.7	SE_M = 0.59	
70-79	9	373	17.0		
Total	373				

The descriptive statistics for the TES are given in Table-11.3. The mean, median and mode of the TES were 46.86, 46.00 and 42.00 respectively. The SD of the scale was

Fig-11.1: Original and Smoothed frequency polygon based on data given in table-11.3



11.40. The maximum score obtained by the sample was 75 while the minimum score obtained was 14, giving a range of 61. To determine the .95 and .99 confidence interval limits of the population means, the Standard Error of Mean (SE_M) was calculated. This was found to be 0.59. The .95 and .99 confidence level limits[1] of the true values of this sample

[1] Mean $\pm$ 1.96×SE_M = 46.86 $\pm$ 1.96 × 0.59 for 0.95 confidence level
Mean $\pm$ 2.58×SE_M = 46.86 $\pm$ 2.58 × 0.59 for 0.99 confidence level

mean are 45.70 and 48.02; and 45.33 and 48.38 respectively. A standard frequency polygon (see figure No.11.1) has been drawn from the data given in table 11.3. The result indicates that the distribution is only slightly negatively skewed (Skewness = -.03). In this distribution Kurtosis is -0.14, which indicates distribution of the scores is platykurtic (fig. 11.1).

11.4.0 Factor Analysis of the TES

A factor analysis procedure had been employed in order to identify the latent or common traits of the items in the TES and also to see whether the selection of items had been justified. Another reason was to formulate a series of summated scales in order to compare the views of students in relation to the selected variables. So, firstly, Principal Component Analysis (PCA) was employed to extract the latent trait or the underlying factors of the 20 TES items. Secondly, Varimax Rotation was used to maximise the relationships between the variables and some of the factors.

Table-11.4 shows the result of the PCA where the Eigenvalues and the percentage of variance extracted by the factors are shown. Only factors having Eigenvalues greater than 1 were considered for the proposed analysis (Kaiser, 1960). The results of Varimax Rotation for the extraction of the underlying traits are presented in the same table. In this rotation, the axes were turned about the origin until an alternative position of the loadings

Table-11.4 : Principal Component Analysis (PCA) and Varimax Rotation of TES

Principal Component Analysis of TES				Rotated Factor matrix of TES		
Factors	Eigenvalue	Percent of variance	Cumulative percent	Factors	Items	Factor loading
1	3.71	18.5	18.5	1	Q10 Q11 Q13 Q12 Q19	.74 .72 .57 .52 .39
2	1.70	8.5	27.0	2	Q3 Q4 Q1 Q2 Q8	.70 .66 .61 .53 .33
3	1.30	6.5	33.5	3	Q22 Q18 Q20	.64 .62 .50
4	1.22	6.1	39.6	4	Q_6 Q_7	.70 .68
5	1.16	5.8	45.4	5	Q17 Q16 Q_15	.66 .43 -.66
6	1.01	5.0	50.4	6	Q_14 Q_9	.76 .67

was reached. Only the maximum values of item loading (greater than 0.30) with respect to their factors are presented in Table 11.4, to facilitate interpretation.

Altogether, 6 factors emerged with Eigenvalues above 1. These explain 50.4% of the variance. The first factor extracted had an Eigenvalue of 3.71 and accounts for 18.5% of the variance. The second factor had an Eigenvalue 1.70 and accounts for 8.5% of variance. Factors 3, 4, 5 and 6 extracted account for 6.5%, 6.1%, 5.8% and 5.0% of the variance respectively.

Factor one: The five items in factor one reflect relationships between teacher and students: teachers having good relations with students, teachers being friendly with students, students trusting in the teacher, teachers being humorous with students, and teachers encouraging students to participate in classroom activities. The significant loadings ranged from 0.74 to 0.39. This factor may be called "*Teacher-Pupil relations*".

The remaining five factors, which did not meet the criterion of accounting for at least 10% of the variance, will be explored here to create summated scales which could be used in an analysis of TES in relation to students' personal, cognitive and motivational, and organisational variables.

Factor two: This factor contains five items related to teachers directing students in the classroom: encouraging students to take decisions, creating imaginative situations, encouraging independent thinking, encouraging students to ask any type of question and praising openly new ideas expressed by students. This factor could be identified as "Teacher-Initiation ".

The third factor had significant loadings ranging from 0.64 to 0.50 related to organisation of classroom activities. The items were students' ideas or suggestions being used during classroom discussions, encouraging discussion in groups and students asking questions. This factor was called "*Classroom organisation*"

The fourth factor describes "*teachers'-attention*" in the classroom: becoming anxious about unexpected questions and ignoring the students when they raise questions. The significant scores on factor five are students getting the chance to speak in the class and the teacher giving interesting examples from different fields. High negative scores indicate disagreement with " Does the teacher discourage you from following your own interests? This factor is called "*Creating Interest*".

Finally, a significant positive score on factor six indicates agreement that the teacher is strict with students and that 'the teacher criticises for no good reason'. This factor may be described as *"Strict control"*

11.5.0 Formulation of sub-summated scales

The six summated sub-scales, which emerged as a result of PCA, were each given a name. The six sub-scale totals were pooled to give the total score of TES. The assigned total TES scores ranged from 0 to 80, and the obtained scores ranged from 14 to 75. The basic statistics Mean and SD of the scales are presented in table 11.5.

Table-11.5 The summated sub-scales of TES and its basic statistics

Sub-scale / Scale	Possible scores	Obtained scores	Mean	SD
	Minimum-Maximum	Minimum-Maximum		
1. Teacher-Pupil relationship (TP)	0 - 20	0 - 20	12.74	4.66
2. Teacher-Initiation (TI)	0 - 20	1 - 20	10.72	4.28
3. Classroom Organisation (CO)	0 - 12	0 - 12	4.58	2.71
4. Teacher Attention (TA)	0 - 8	0 - 8	6.01	2.04
5. Creating Interest (CI)	0 - 12	0 - 12	7.78	2.47
6. Strict Control (SC)	0 - 8	0 - 8	5.38	2.06
Total TES	0 - 80	14 - 75	46.86	11.40

11.6.0 Analysis of TES in relation to selected variables

The Teacher Encouragement Scale might be an intervening variable affecting creativity. To explore this it is necessary to undertake a detailed analysis of TES in relation to selected variables. Hence, an attempt has been made to analyse TES in relation to the following variables:

(A) Sex and Teacher Encouragement
(B) Medium of Instruction and Teacher Encouragement
(C) Type of school and Teacher Encouragement
(D) Level of students' Creativity and Teacher Encouragement

Initially a correlation analysis was employed, followed by a t-test or Analysis of Variance (ANOVA) to test the significance of mean differences of selected variables.

The results of the correlation analysis are presented in Table 11.6. This shows that sex and medium of instruction have a negative correlation with TES, which is not significant even at 0.05 level, although some of the sub-scales of TES were found to be significant at various levels.

Type of school consists of three groups, Girls', Boys' and Co-educational schools, which enabled creation of two dummy vectors[2]. The correlation matrix shows that the Girls' schools had a negative relationship with TES (-0.05; p>0.05), which is not statistically significant. For Boys' schools (coded as '1') the relationship was positive (r=.14) and highly significant. The mean (51.00) for boys school students was higher than the mean scores of students from co-educational schools (46.41) and girls (45.96)

The correlation (r=.22) between students' level of creative thinking as measured by Tests of Creative thinking[3] and TES was highly significant at 0.001 level. The correlations between TES sub-scales and level of creative thinking were also significant at various levels. The positive relationship may be interpreted as: the greater the teacher encouragement, the higher the level of the students' creative thinking.

Table-11.6: Correlations of selected variables with TES and its sub-scales

Variable	TP	TI	CO	TA	CI	SC	Total TES
1.Sex	-.11*	.00#	-.12*	.08#	-.03#	-.09#	-.08#
2.Midium of instruction	-.08#	.19***	-.09#	-.22***	.08#	-.21***	-.06#
3. Type of School (TS-Girls)	-.00#	.00#	.04	-.22***	.01#	-.10#	-.05#
4. Type of School (TS-Boys)	.05#	.31***	-.09#	.02#	.13*	-.06#	.14**
5. Level of creativity	.12*	.14**	.03#	.24***	.14**	.14**	.22***
Total TES	.78***	.71***	.58***	.33***	.61***	.44***	1.00

. TP =Teacher-Pupil relationship TI =Teacher-Initiation CO = Classroom Organisation
TA =Teacher Attention CI = Creating Interest SC =Strict Control
* significant at 0.05 level ** significant at 0.01 level *** significant at 0.001 level

Further, an attempt has been made to probe into the question of variance between TES and selected variables. ANOVA or t-tests were used to find the mean differences. These are presented in Tables-11.7 to 11.10.

11.7.1 Sex and Teacher Encouragement

A t-test analysis to look into the differences in mean between the boys and girls was attempted. The results are revealed in table 11.7. On the overall assessment of Teacher Encouragement Scale (TES) girls and boys did not significantly differ (t=1.49, p>0.05), although the girls' mean (47.56) was slightly higher than the boys' mean (45.77).

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[2] For more details of coding and creating dummy variables see Chapter X, sec. 10.4.0.

[3] Verbal test of creative thinking as measured by Prof. Baqer Mehdi and non-verbal test of creative thinking as measured by Prof. Baqer Mehdi

The mean differences between boys & girls on the TES-sub-scales for teacher–initiation, teacher–attention, creating interest and strict control were not significantly different.

Table 11.7 shows that, on the Teacher–pupil relation sub-scale, the girls' assessment mean score was greater (M=13.15) than the boys' (M=12.12). This difference was significant ($p < 0.05$) and suggests that girls are more happy about their relations with their teachers than boys.

Similarly, on the classroom-organisation sub-scale, the girls' (M=4.85) mean score is greater than the boys' (M=4.19). This was statistically significant ($p < 0.05$) and suggests that the girls are more satisfied with the teachers' classroom organisation, for instance their ideas/suggestions being used in the classroom, discussing things in groups and asking questions on their own.

Table 11.7: Mean Scores, SDs, SE_m and t-values of TES of subjects (SS) in relation to their Sex.

Scale/sub-scale name	Sex	N	Mean	SD	SE_m	t-value
1. Teacher – pupil relation	Girls (0)	226	13.15	4.73	0.32	
	Boys (1)	147	12.12	4.51	0.38	2.06*
2. Teacher Initiation	Girls (0)	226	10.71	4.17	0.28	
	Boys (1)	147	10.73	4.46	0.37	0.04#
3. Classroom Organisation	Girls (0)	226	4.85	2.83	0.19	
	Boys (1)	147	4.19	2.48	0.21	2.30*
4. Teacher attention	Girls(0)	226	5.88	2.13	0.14	
	Boys (1)	147	6.21	1.90	0.15	1.48#
5. Creating Interest	Girls (0)	226	7.84	2.51	0.17	
	Boys (1)	147	7.68	2.42	0.21	0.57#
6. Strict control	Girls (0)	226	5.54	2.09	0.14	
	Boys (1)	147	5.14	2.01	0.17	1.86#
7. Overall TES	Girls (0)	226	47.56	11.92	0.79	
	Boys (1)	147	45.77	10.46	0.86	1.49#

*= Significant at 0.05 level # = Not significant

11.7.2 Medium of Instruction and Teacher Encouragement

On the basis of the obtained average scores (Table-11.8) of the Telugu-medium students (M=47.45), it seems that, they were more positive about teacher encouragement than the English medium students(46.16), But the difference is not statistically significant ($t=1.09$, $p>0.05$.

As Table 11.8 illustrates, there is a significant relationship between the, medium of instruction and the mean scores on three out of the six sub-scales of TES. There is a tendency for the English medium students to score significantly higher on the "Teacher-Initiation" sub-scale ($p<0.01$), which means they perceived that the teacher encourages them to take decisions, creates imaginative situations, promotes independent thinking,

encourages them to ask any type of question in the class and praises new ideas expressed by students.

There is a tendency for the Telugu-medium students to score a significantly higher mean on the "teacher attention" sub-scale ($p<0.01$), which indicates that the teachers are not anxious about unexpected questions and do not ignore the students when they raise questions in the class.

Similarly, on the "strict control" sub-scale the difference is significant ($p<0.01$). The English-medium students' mean score (M=4.92) is lower than Telugu-medium students mean scores (M=5.77). This indicates that the teachers in English medium are more strict and critical than teachers in Telugu medium, as perceived by the students.

Table 11.8: Mean Scores, SDs, SE_m and t-values of TES of subjects (SS) in relation to their Medium of instruction

Scale/sub-scale name	Medium	N	Mean	SD	SE_m	t-value
1. Teacher – pupil relation	Telugu (0)	202	13.08	4.69	0.33	
	English (1)	171	12.33	4.62	0.36	1.54#
2. Teacher Initiation	Telugu (0)	202	9.99	4.33	0.31	
	English (1)	171	11.59	4.06	0.31	3.61**
3. Classroom Organisation	Telugu (0)	202	4.83	2.76	0.20	
	English (1)	171	4.29	2.63	0.20	1.90#
4. Teacher attention	Telugu (0)	202	6.42	1.99	0.14	
	English (1)	171	5.52	2.00	0.15	4.32**
5. Creating Interest	Telugu (0)	202	7.61	2.49	0.18	
	English (1)	171	7.98	2.44	0.19	1.41#
6. Strict control	Telugu (0)	202	5.77	1.99	0.14	
	English (1)	171	4.92	2.06	0.16	4.04**
7. Overall TES	Telugu (0)	202	47.45	12.14	0.85	
	English (1)	171	46.16	10.42	0.80	1.09#

**= Significant at 0.01 level # = Not significant

11.7.3 Type of school and Teacher encouragement

It is evident from Table-11.9 that the F-ratio (3.67) obtained for the differences in the TES means for different types of schools, i.e., Girls', Boys' and Co-educational, is significant at the 0.05 level. Boy's school students perceive greater teacher encouragement when compared with Girls' and Co-educational school students. With regard to the sub-scales of TES, significant differences between the type of school and the mean scores on four of the six sub-scales of TES were found.

On the Teacher-Initiation sub-scale, the Boys' school students perceive greater teacher-initiation in the classroom ($p<0.0001$). They also perceive that their teachers "create interest"($p<0.001$). This suggests that teachers working in Boys' school are

perceived as creating interest among the students and encouraging the students to be self-reliant to a greater extent than those in girls or co-educational schools.

With regard to the sub-scales for "teacher attention" and "strict control", the students from co-educational schools scored higher means 6.34 and 5.61 respectively,

Table -11.9: Mean Scores, SDs, SE_m and F-ratio of TES of subjects (SS) in relation to the type of the school (sex wise)

Scale/sub-scale name	Type of the school	N	Mean	SD	SEm	F-ratio	Mean
1. Teacher – pupil relation	G1-Girls	111	12.71	4.54	0.44		
	G2-Boys	47	13.33	3.88	0.57	0.42#	
	G3-Co-edu	215	12.63	4.88	0.33		
2. Teacher Initiation	G1-Girls	111	10.75	3.89	0.37		G2
	G2-Boys	47	14.20	3.93	0.58	20.66****	G1 *
	G3-Co-edu	215	9.94	4.18	0.29		G3 *
3. Classroom Organisation	G1-Girls	111	4.75	2.68	0.26		
	G2-Boys	47	3.96	2.35	0.35	1.48#	
	G3-Co-edu	215	4.63	2.79	0.19		
4. Teacher attention	G1-Girls	111	5.34	2.02	0.19		G1
	G2-Boys	47	6.11	1.90	0.28		G2 *
	G3-Co-edu	215	6.34	2.01	0.14	9.14***	G3 *
5. Creating Interest	G1-Girls	111	7.81	2.52	0.25		G2
	G2-Boys	47	8.59	2.28	0.34	3.16*	
	G3-Co-edu	215	7.58	2.46	0.17		G3 *
6. Strict control	G1-Girls	111	5.08	2.14	0.20		G1
	G2-Boys	47	5.04	2.11	0.31	3.19*	
	G3-Co-edu	215	5.61	1.99	0.14		G3 *
7. Overall TES	G1-Girls	111	45.96	10.39	0.99		G2
	G2-Boys	47	51.00	9.27	1.35	3.67*	G1 *
	G3-Co-edu	215	46.41	12.12	0.82		G3 *

**** Significant at 0.0001 level ***Significant at 0.001 level *Significant at 0.05 level

when compared to their counterparts. The F-ratios for "teacher-attention" scale and "Strict control" scales are found to be 9.14 ($p<0.001$) and 3.19 ($p<0.05$) respectively. This indicates that the teachers working in co-educational institutions are perceived as more flexible and more attentive in the classroom.

11.7.4 Students' level of creative thinking and TES.

The correlation ($r=.22$, $p<0.001$) between level of creativity and teachers' encouragement as measured by TES was highly significant at 0.001 level(see table-11.6). Further, Analysis of Variance (ANOVA) was applied to see the mean differences among the three categories of low, average and high creativity. The classification into the three groups was explained in Chapter X, in sec. 10.5.1.

Table 11.10 shows that the TES mean scores of low, average and high creativity groups were 43.00, 46.68 and 51.47 respectively. There seem to be differences in the mean

scores between the groups. The Analysis of variance (ANOVA) reveals that the F-ratio for these groups is 9.11($p<0.001$), which is highly significant.

Further, the significant mean differences between the groups show that the levels of the highly creative students mean' scores on TES are higher than those of the average creative group, followed by the low creative group. This indicates that the level of students' creativity may be proportionate to the teacher's encouragement. The highly creative students perceived greater teacher encouragement as measured by TES than their counterparts, the average and low creative students.

Table -11.10: Mean scores, SDs, SE_m and F-ratio of TES of subjects (SS) in relation to the level of students' creativity

Scale/sub-scale name	Level of creativity	N	Mean	SD	SEm	F-ratio	Mean
1. Teacher – pupil relation	Low (1)	63	11.83	4.51	0.58		
	Avg (2)	248	12.72	4.75	0.31	2.45#	
	High (3)	62	13.69	4.34	0.55		
2. Teacher Initiation	Low (1)	63	10.11	4.12	0.53		G1 G2
	Avg (2)	248	10.49	4.24	0.27	4.99**	
	High (3)	62	12.27	4.32	0.56		G3 * *
3. Classroom Organisation	Low (1)	63	4.50	2.90	0.36		
	Avg (2)	248	4.56	2.61	0.17	0.19#	
	High (3)	62	4.77	2.94	0.37		
4. Teacher attention	Low (1)	63	5.02	2.14	0.27		G1
	Avg (2)	248	6.09	2.05	0.13	11.78****	G2 *
	High (3)	62	6.71	1.52	0.19		G3 *
5. Creating Interest	Low (1)	63	7.28	1.97	0.26		G1 G2
	Avg (2)	248	7.72	2.57	0.17	3.76*	
	High (3)	62	8.48	2.39	0.31		G3 * *
6. Strict control	Low (1)	63	4.76	2.16	0.27		G1
	Avg (2)	248	5.45	2.03	0.13	3.90*	G2 *
	High (3)	62	5.73	2.00	0.25		G3 *
7. Overall TES	Low (1)	63	43.00	9.48	1.19		G1 G2
	Avg (2)	248	46.68	11.44	0.72	9.11***	G2 *
	High (3)	62	51.47	11.50	1.46		G3 * *

**** Significant at 0.0001 level ***Significant at 0.001 level ** Significant at 0.01 level
*Significant at 0.05 level

Table 11.10 shows that there is a significant relationship between the level of creativity and the mean scores on four out of the six sub-scales of TES.

As the results shown in table 11.10 indicate on the Teachers' Initiation sub-scale, the highly creative students' mean score (12.27) is more than the average (10.49), and low groups (10.11). The F-ratio 4.99 ($p<0.01$), is significant. This means that highly creative children perceive, compared with their counterparts that their teachers encourage students

to take decisions, create imaginative situations in the class, encourage them to think independently, encourage them to ask any type of question, and praise them for new ideas.

With regard to the "teacher-attention" sub-scale, the F-ratio was found to be 11.78. This is highly significant at 0.0001 level. This indicates that highly creative children perceive that their teachers do not ignore them when they raise questions and the teachers are not anxious when they ask unexpected questions, when compared to their counterparts in average and low creative groups.

For the sub-scale "creating interest", the F-ratio was found to be 3.76, which is significant ($p<0.05$). The high mean score for the highly creative group (8.48) indicates that they perceive that their teachers give more interesting examples from different fields, that they have the opportunities to speak and that they are not discouraged from following their own interests, when compared to the average and low creative groups.

Finally, on the "strict control" scale, the F-ratio was found to be 3.90, which is significant at 0.05 level. The highly creative groups mean score (5.73) is higher than those of the average (5.45) and low creative groups (4.76). This means that low and average creative group students felt that the teachers were stricter with them and criticised them more for no good reason, when compared with the high creative group.

Section II

11.8.0 Analysis of School Activities

In this section the activities organised by the schools for the promotion of creativity are discussed under six broad categories. The relevant activities have been brought together into categories to enable meaningful interpretation of the results. The questions added and the organisation of the categories are based on the relevant literature which will be briefly considered at the beginning of each section.

Teaching within school alone may not be adequate in this rapidly changing world; provision needs to be is made for students to be aware of and learn from the outer world. Learning can take place out of school as well as in school. Teachers should help students' in discovering different things in the local environment (community) first, and relate these learning experiences to normal classroom lessons. This will give real meaning and context to the students' experience as well as contributing to their understanding of particular subjects and topics.

UNESCO (1996) emphasise the provision of opportunities for children as follows:

"It is therefore important to provide children and young people with every possible opportunity for discovery and experiment – aesthetic, artistic, sporting, scientific, cultural and social – as well as appealing introductions to the creation of their contemporaries or earlier generations. Art and poetry, too often taught in a way that has become more utilitarian than cultural, should again be given more importance in schools then is commonly the case in many countries. The desire to develop the imagination and creativity should also result in higher regard being paid to oral culture and knowledge derived from the child's or adults' experience"(p.95).

It is also appropriate to mention Harrison's (1970, p.9) view on how learning takes place out of the school:

There is a growing concern to widen children's horizons. The cloistered idea of education is out and more and more people realise that a child is more likely to learn to live creatively in the world if he has not been separated from that world while he is growing up. This does not of course detract from the great importance of education in school but underlines the idea that education at home, in the club, the street, the museum and the library is just as fruitful and that parents and teachers need to consider the child's environment as a whole.

11.8.1 Expressive and Explorative Activities

"Creativity involves expressing ideas and feelings and using a range of ways to do" (Beetlestone, 1998, p.2). It involves making: using the imagination, creating, composing, authorship, musical skill, performance, planning, constructing, building technical skills and large and small scale output – it is almost like a production line (pp. 2-3).

Taking account of these perspectives, schools need to organise expressive and explorative activities for promoting the talents of their students. Mathematics clubs, Science clubs or other subject clubs are helpful in encouraging pupils to carry out their ideas. As Kids' Clubs Network suggest (1992, p.5) 'an out-of-school club is a centre of child development through socialisation, play, relaxation and recreation'.

These clubs may be formed with interested students under the supervision of the subject teacher/s, on the school premises to enhance the child's security. These clubs may open after school hours between 4.30 PM to 6.30 PM in the evening and also in school holidays from 10.00 AM to 4.00 PM or they can negotiate a timing suitable for the students and teachers. Of course these timings may not suit shift schools which close in early afternoons. These can fix their own timings

The clubs may be divided into groups, depending on how many members they have, to undertake projects, to visit important sites in or outside the city under the supervision and direction of the subject teacher. Here the teacher acts as chief organiser, advisor and general consultant.

Presentations in seminars or in classrooms give an opportunity for students to express their ideas, their project results or content from any school curriculum subject. In such presentations the students may prepare and use OHP transparencies, handouts, wall-posters, models, etc., to make the presentation impressive and attractive. A presentation involves many things which need to be considered: the aim of the presentation / purpose (the Why), the content/ message (the What), the audience / classmates (the Who), the learning method (the How) and the learning environment (the When (time) and Where (location)) (see Herring, 1996,p.147-48).

Further, as Herring said, the quality of an oral presentation, given suitably structured and intellectually coherent content, depends on its delivery. The ability of pupils to deliver oral presentations will very much depend on what experience they have had in making presentations in their school career (p.148)

The library occupies a generalist position in the information network, as a place where students expect to be able to find things out. The laboratory allows the students to explore, experiment and opens the doors for new avenues. This is the place where students can search for truth, find solutions to many unanswered questions, search for concrete evidences and draw conclusions. The laboratory gives scope for students to formulate their hypotheses or assumptions and test them. Literature will enrich the imagination, the intellect, and will be an experience in their lives. Entering the realm of books fires the child's imagination.

The recent innovation of the Internet has brought about a revolution in the world of information technology. The Internet is a source of information, like a vast library which holds bundles of information in the form of texts, graphics, sound, video etc. The Internet also provides searching facilities for exploring or seeking information from all over the world.

To assess the provision of such resources in the schools, the head teachers were asked whether or not Science and Mathematics clubs were established for encouraging pupils to explore ideas in their schools, and if not, whether they should be established. Out of nine schools, four schools (44%) said that they had Science and Mathematics clubs. However, there was a high level of agreement (100%) for the need to establish clubs in the school. A total of 78% (7 schools) said that they assisted pupils in participating in activities of student interest inside and outside the school, and special lectures/programmes to inspire the students were organised by eminent personalities in different fields (e.g. Artists,

Musicians, Scientists, Writers etc.). There were very few schools (22%) which organised Science fairs and Exhibitions, but about 80% of the schools participated in Science fairs and Exhibitions (see table 11.11).

A small percentage of schools (33%) were able to organise seminars and encourage student presentations in the school or class. A large number of schools failed to provide library facilities (89%) and laboratory facilities (78%). All the schools failed to provide computer facilities or publish school magazines to encourage students' publications.

Table: 11.11 : Expression and Exploration Activities organised in the schools

Qn o	Statement	Organised in the school		Need to be organised in the school	
		Yes (%)	No (%)	Yes (%)	No (%)
1.	Encouraging pupils to explore ideas through				
	(i) Science clubs	4 (44)	5 (56)	5 (100)*	
	(ii) Maths clubs	4 (44)	5 (56)	5 (100)*	
2.	Assist pupils in participating in the activities of their interest in and outside the school	7 (78)	2 (22)		1 (50)
3.	Organisation of				
	(i) Science fairs	2 (22)	7 (78)	7 (100)*	
	(ii) Exhibitions	2 (22)	7 (78)	7 (100)*	
	Participation in				
	(i) Science fairs	7 (78)	2 (22)	2 (100)*	
	(ii) Exhibitions	7 (78)	2 (22)	2 (100)*	
4.	Special lectures/Programmes organised to inspire the students by eminent personalities in different fields eg. artists, musicians, scientists, writers etc.,.	7 (78)	2 (22)	2 (100)*	
5.	Organised / Encouraged				
	(i) Seminars,	3 (33)	6 (67)	6 (100)*	
	(ii) Student presentations in the school / class etc.,	3 (33)	6 (67)	6 (100)*	
6	School magazines to encourage students publications	0 (00)	9 (100)	9 (100)*	
15	Computers provided for the students (eg. Computer applications,/ Internet / Computer games)	0 (00)	9 (100)	8 (89)	1 (11)
16	Laboratory facilities available for the students in the school	2 (22)	7 (78)	7 (100)*	
17	Library facilities provided for the students in the school	1 (11)	8 (89)	7 (88)*	2 (22)

Note: Percentages within the brackets were rounded to integers

* Percentages calculated on the basis of 'No' responses to 'Organised in the school'

11.8.2 Exhibiting Art and related activities.

Schools can also make successful use of visiting artists. These artists may be local artists, those who are undertaking art work or art courses, craftsmen and technicians. Such visits will greatly encourage students' curiosity and enthusiasm. The purposes of teaching of art to children are: to develop their artistic skills drawing, painting, printing, use of colour, use of textiles, 3-D modelling; develop their visual perception, visual literacy and appreciation; develop appreciation of the work of other artists from a variety of cultures and styles, and give opportunity for personal expression and creative endeavour. Central to art education is to develop observational skill and drawing- sketching, drafting, and editing (Piotrowski, 1994,p.138-40).

It is also important to make the classroom more interesting for the students. This may be possible by providing displays on the wall, which will attract the attention of the children and encourage them to think. These displays can promote flashbacks to previous thoughts, strengthen ideas or lead to the generation of spontaneous ideas. Beetlestone (1998, pp.73-74) emphasises the use of displays and how they enhance the creative process:

Teachers should use displays to

- show that children's work is valued and enhance individual self-esteem;
- provide an audience for work to be viewed critically, developing the skills needed for aesthetic appreciation;
- provide chances for children to do their own displays, increasing a feeling of ownership and aesthetic discrimination;
- and enable interaction so children can learn through enactive as well as iconic and symbolic modes, promoting a feeling of ownership of the displays.

The exhibition of students' own artwork, and of other school students' artwork or visits to other schools can develop a competitive spirit among students. It is also important that the practice of reproduction of the works of master artists by the students is facilitated to promote understanding of the meaning of the picture. They need to start thinking, why that picture is considered important? Why is it unique? These activities can encourage a strong desire of inspiration to produce such work on their own.

Chapman (1997, pp.114-15) explains the learning sequence in four processes[4] and applies this to painting:

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[4] The learning sequence divides into four processes which are interconnected and interact with each other. They are perceiving (sensing, receiving, experiencing); transforming (thinking, feeling, imagination, intuition

When painting a landscape (expressing), a child is observing and absorbing a scene in the natural environment (perceiving); thinking about the way the scene might be interpreted or changed to achieve the desired effect (transforming); and standing back to view, analyse, criticize and reflect upon the work as it progresses and when it is completed (appreciating).

The headteachers were asked about the promotion of creative activities in their school. Table 11.12 shows that, drawing and painting, were the most common activities conducted in the schools (67%). But about 70% of schools failed to 'exhibit or display student artwork in school' and 'exhibit / display other schools' artwork or visit other schools'. They also failed to do 'reproduce the works of master artists (89%) by the students' and 'reproduce the work of their school students by other students' (100%). Further, they failed to organise videos pictures (100%), slide shows (67%) or film shows (56%).

Table: 11.12: Exhibiting Art and related activities organised in the schools.

Q.No	Statement	Organised in the school		Need to be organised in the school	
		Yes (%)	No (%)	Yes (%)	No (%)
7	Exhibition / display of students' art works in the school.	3 (33)	6 (67)	6 (100)*	
8	Exhibition / display of other school student's art work or visit to other schools	3 (33)	6 (67)	6 (100)*	
9	(i) Reproduction of the works of master artists by the students	1 (11)	8 (89)	7 (88)*	1 (11)*
	(ii) Reproduction of your school students' art works by other students	0 (00)	9 (100)	7 (78)*	
10	Organised shows for the students				
	(i) Films	4 (44)	5 (56)	4 (80)*	
	(ii) Slides	3 (33)	6 (67)	5 (83)*	
	(iii) Videos	0 (00)	9 (100)	6 (67)*	
11	Drawing and painting activities	6 (67)	3 (33)	3 (100)*	

Note: Percentages within the brackets were rounded to integers
* Percentages calculated on the basis of 'No' responses to 'Organised in the school'

11.8.3 Handicraft and related activities

Constructing or designing with different materials can help in pupils' understanding of shapes. Through handcraft and related activities pupils can gain greater knowledge and understanding about what they are doing. The children are not only actively participating but also work themselves in a practical way. As Moyles (1989, p.79) argues, natural materials such as wood, clay, sand and water lend themselves to free

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and problem-solving); expressing (revealing thoughts, feelings and understanding in artistic form); and appreciating (reflecting, analysing, criticizing and valuing art).

exploration and to the development of children's imaginative interpretation. They have properties which 'are highly conducive to creative play'.

From table 11.13, it can be seen that about 70% of schools encouraged students in construction and design using clay, plaster of Paris, wood etc. More than 50% of schools trained their students in embroidery, knitting etc. A high percentage (88%) of schools failed to provide opportunities for the students to make masks and puppets.

Table:11.13 Handicraft and related activities organised in the schools

Qno	Statement	Organised in the school		Need to be organised in the school	
		Yes %	No %	Yes %	No %
12	Masks and puppets made from paper bags, paper mache (paper strips pasting layer after layer / paper pulp) and other materials.	2 (22)	7 (88)	6 (86)*	1 (14)*
13	Constructions and designs with clay, plaster of Paris, wood etc.,	6 (67)	3 (33)	1 (33)*	1 (33)*
14	Embroidery, knitting, etc.,	5 (56)	4 (44)	3 (75)*	

Note: Percentages within the brackets were rounded to integers

* Percentages calculated on the basis of 'No' responses to 'Organised in the school'

11.8.4 Outings and related activities

"Museums are treasure-houses. These treasures may have been brought from the end of the earth; they may be things of today or of long ago; they may be natural things or man-made things" (Harrison, 1973,p.6). Elegantly designed 'Cabinets of Curiosity' or 'Closets of Rarities' housed these early collections (Adams, 1989,p.1). Museums are in a unique position to alleviate ignorance and to foster and satisfy interest (DES, 1973,p.8).

"Museums and galleries offer the visitor a scintillating array of the treasures of man's past. Treasures in various forms, ranging through man's highest artistic achievements, his scientific discoveries, his progress in technology, his means of travel, exploration and discovery, his everyday life, his struggles with his own kind and natural background" (UNESCO, 1973,p.23). Museums for demonstration and exploration of man's origins, history and achievements, artistic, technical or scientific, particularly in a regional or local context, can both encourage a sense of continuity with the past and help to explain the context of local society in a time of social change and technological advance (DES, 1973, p.8).

Museums can fire the imagination; they can set standards and widen horizons; they can help to develop the ability to concentrate, explore and observe; above all they can be enjoyed (Harrison, 1970,p.11-12). By imaginative displays and interpretation museums can

impart knowledge, provoke questions, stimulate thought and lead their visitors on to further study (DES, 1973,p.8).

Through visiting art galleries / art exhibitions students can realise the importance of art and how people have enjoyed art throughout history and across cultures. Children may notice and give attention to general structures and specific details. They should be encouraged to look at shapes in order to discern patterns, line, similarities and differences. They should then analyse and describe their observations. Often this is done by sketching and drawing (Piotrowski, 1994, p.139).

Field trips are a most important device for studying community resources[5]. Field trips provide not only an interesting approach to learning but also one that provides answers to many of students' queries (Khan, 1980, pp. 15-16). Field trips or excursions can provide opportunities to learn through experience and direct contact with the field. They also offer excitement, pleasure and curiosity to the children.

The majority of the schools arranged visits to historical monuments (78%) and museums (78%). From table 11.14 it is also evident that many secondary schools do not have any sort of outdoor activities going on. Schools mostly failed to visit art galleries (100%), craftsmen work places (89%), technicians' work places (89%), artists work places (67%) and art exhibitions (56%). These results indicate that the schools give little importance to art-related activities.

Table 11.14 Outing and trips related activities organised in the schools

Qno	Statement	Organised in the school		Need to be organise in the school	
		Yes (%)	No (%)	Yes (%)*	No
18	Visits to				
	1. Historical monuments	7 (78)	2 (22)	2 (100)*	
	2. Art galleries	0 (00)	9 (100)	6 (67)*	1 (11)*
	3. Museums	7 (78)	2 (22)	2 (100)*	
	4. Art exhibitions	4 (44)	5 (56)	3 (60)*	
	5. Local artists Work places	3 (33)	6 (67)	4 (67)*	
	6. Craftsmen's work places	1 (11)	8 (89)	5 (63)*	
	7. Technicians' work places	1 (11)	8 (89)	5 (63)*	
19	Organised				
	1. Field trips	3 (33)	6 (67)	5 (83)*	
	2. Educational Tours / Excursions	6 (67)	3 (33)	2 (67)*	

Note: Percentages within the brackets were rounded to integers

* Percentages calculated on the basis of 'No' responses of 'Organised in the school'

[5] For example the community's natural resources, the industries, services and occupations, the physical setting of the community, streets and transport system.

The majority of schools (67%) organised educational tours and excursions. However 67% of schools failed to organise field trips.

11.8.5 Competitive and Voluntary activities

Games and sports have long been assumed to influence character and conduct. Teamwork helps children to get along with others. It instils into them a spirit of sportsmanship. Social ties strengthen and pupils learn the lesson that to obey is as important as to give orders. Straight forwardness, endurance and fairness can result from games playing. Games can improve physical health, which in its turn can pave the way for moral health. In the case of inter-school competition, the child can learn the lesson of loyalty, team spirit and love (Khan, 1980, p.20). Games can be helpful in channelling the energies, developing high competitive spirit, developing the tendency of looking for various possible solutions in challenging situations and struggling determinedly to achieve a goal. Of course they may not always achieve these ends. Head teachers were asked questioned about competitive and voluntary activities in their schools.

The data in table 11.15 indicate that a high percentage of schools were able to conduct debates (100%) and essay competitions (89%) for their students. Besides these about 90% of the schools were successful in providing games and sports but only 56% of the schools provided opportunities for athletics. As for "voluntary social activities', most schools failed to run NSS, NCC and Scouts (89% each). Generally they also did not provide vocational training for students (67%) or socially useful productive work (56%).

Table:11.15 Competitive and Voluntary activities organised in the schools

Qno	Statement	Organised in the school		Need to be organise in the school	
		Yes (%)	No (%)	Yes (%)	No (%)
20	1. Debate	9 (100)	0 (00)		
	2. Essay competition	8 (89)	1 (11)	1 (100)*	
21	1. Sports	8 (89)	1 (11)	1 (100)*	
	2. Athletics	5 (56)	4 (44)	2 (50)*	
	3. Games	8 (89)	1 (11)	1 (100)*	
22	(i) National Service Scheme (NSS)	1 (11)	8 (89)	8 (100)*	
	(ii) National Cadet Corps (NCC)	1 (11)	8 (89)	8 (100)*	
	(iii) Scouts	1 (11)	8 (89)	8 (100)*	
23	1. Socially Useful Productive Work (SUPW)	4 (44)	5 (56)	5 (100)*	
	2. Vocational training	3 (33)	6 (67)	6 (100)*	

Note: Percentages within the brackets were rounded to integers

* Percentages calculated on the basis of 'No' responses to 'Organised in the school'

11.8.6 Decorative and Artistic Activities

School grounds offer a potentially limitless range of experiences and opportunities for the children. Children spend a great deal of their childhood in school grounds (Titman, 1994, p.103).

Titman writes that 'an ideal playground is a place for doing, a place for thinking, a place for feeling and a place for being'. While explaining school grounds as a place for thinking, he writes that they can provide intellectual stimulation, things which can be discovered and studied and learned about by pupils themselves and with friends. This allows pupils to explore, discover and understand more about the world they live in (p.58).

Gardening has obvious benefits to physical development, which in turn affects creative development (Beetlestone, 1998, p.122). It provides opportunities to create new plant life and thus to stimulate children's spiritual and emotional development. Working outside provides a sensory environment where children are exposed to changes in light, temperature and elements of weather and to a range of auditory and visual images. The visual perspective is wider, further distances are involved and thus the child's focus is broadened. Gardening is also a social experience in which children have a chance to create something collaboratively and to share their creative experience (p.124).

The true nature of educational drama lies in the exploration and communication of ideas, issues, subject content, themes, stories and feelings through participatory action and imagination. "Drama is not only to train the children to be actors, but can enable them to learn in a way which is active, experimental and memorable" (Clipson-Boyles, 1997). It can be used as a learning method. It also provides strong and meaningful contexts for evaluation and reflection (pp.204-05). "Providing for imaginative exploration of ideas through play and drama is essential for developing creativity" (Beetlestone, 1998, p.89). Further, Beetlestone explains that role-play helps children to bridge the gap between fantasy and reality. Imagination often takes us into the realm of fantasy. In role-play children can try out new versions of their characters (pp. 77-78).

If creativity is about expressing inner ideas, feelings and emotions then it is also about children's play – the normal way in which the young will express their ideas. "We can use play as a bridge between the world of the imagination and world of reality" (Ibid, p.79). Similarly mono-actions, fancy dress and singing can help in the discipline of groups, as they involve shared tasks, planning, co-operation and the presentation of information verbally or symbolically.

From table 11.16, it can be seen that a very high percentage (89%) of schools enabled their students to participate in school stage decorations and classroom decorations. In addition, 56% of schools involved students in decoration of the school buildings and surroundings. Only 44% were engaged in preparation of wall posters on special occasions and displays.

As far as cultural activities are concerned, the majority of the schools organised activities like singing (89%); drama, mono-actions and fancy dresses (75% each); and plays (67%). Apart these one school head teacher reported 'recitation'. From the same table it is evident that a total of 67% of schools celebrated 'school days'.

Table:11.16 Decorative and artistic activities organised in the schools

Qno	Statement	Organised in the school		Need to be organise in the school	
		Yes (%)	No (%)	Yes (%)	No (%)
24	Decoration of school buildings and surroundings e.g. new arrangements, landscaping of gardens, murals and or putting up art works etc.,	5 (56)	4 (44)	4 (100)*	
25	Students' participation in				
	(i) School stage decorations	8 (89)	1 (11)	1 (100)*	
	(ii) Classroom decorations	8 (89)	1 (11)	1 (100)*	
26	Wall posters prepared on special occasions and displayed.	4 (44)	5 (56)	5 (100)*	
27	Cultural activities				
	1. Drama	7 (78)	2 (22)	2 (100)*	
	2. Plays	6 (67)	3 (33)	2 (67)*	
	3. Mono-actions	7 (78)	2 (22)	2 (100)*	
	4. Fancy dress	7 (78)	2 (22)	2 (100)*	
	5. Singing	8 (89)	1 (11)	1 (100)*	
	6. Others (Recitation)	1 (100)			
28	School Days	6 (67)	3 (33)	3 (100)*	

Note: Percentages within the brackets were rounded to integers

* Percentages calculated on the basis of 'No' responses to 'Organised in the school'

Section - III

11.9.0 The Exploratory Model of the correlates of creative thinking (CT)

To predict the variables contributing to developing creative thinking among the Indian school students, initially, a Stepwise Multiple Regression Analysis was performed. As already mentioned in Chapter VIII, the variables were divided into three categories: background, organisational and cognitive and motivational. The variables under these categories were combined to study their relative contribution to developing creative thinking. The formulated hypothesis is that variation in creative thinking is a function of the variables classified under the above categories.

11.9.1 Multiple Regression Analysis:

The process of constructing a linear equation that will predict the values of a target (dependent) variable from knowledge of specified values of a regressor (Independent variable) can readily be extended to situations where we have data on two or more independent variables. The construction of a linear regression equation with two or more independent variables (or regressors) on the right hand side is known as Multiple Regression.

There are two approaches to multiple regression. In simultaneous multiple regression, all the available independent variables are entered in the equation directly. In Stepwise Multiple Regression, the independent variables are added to (or taken away from) the equation one at a time, the order of entry (or removal) being determined by statistical considerations. Despite the appeal of the second approach, however, there is the disconcerting fact that the addition of another 'Independent' variable can completely change the apparent contributions of the other regressors to the variance of score on the dependent variable (Kinnear and Gray, 1997,p.262)

Initially, those variables which were hypothesised to have an effect on creative thinking were entered into a Stepwise Multiple Regression equation where creative thinking was regressed on the selected variables. A total of 14 variables, were considered for the Multiple Regression Analysis. Some of the variables, such as students' occupational choices, liking and disliking of subjects, good and bad school experiences etc., were discarded because they had multiple responses. In addition, entering too many

variables into the regression equation creates a more complex analysis which can be difficult to interpret[6]. The coding of the variables in this model is given in Appendix-E4.

Table-11.17 shows selected parts of the output (SPSS) for the forward stepwise regression of creative thinking (dependent variable) on all the 13 regressors (independent variables). Out of 13, only 4 independent variables were entered by SPSS into the regression equation. The remaining 9 variables did not reach the criteria (see note under table 11.17 for the list of variables). In this analysis, variables with the F-ratio smaller than 4.0 were not entered into the equation. The variable with the highest correlation with the dependent variable was entered into the equation first.

Table 11.17: Stepwise multiple regression analysis of combined variables (background, organisational and cognitive and motivational variables) with creative thinking as the dependent variable (X_{14})

Variables in the equation	C	Unstandardised Regression Coefficient		Standardised Regression Coefficient	R	R^2	Increment in R2	F-ratio	df
		β	SEβ	Beta					
1. School activities (X_{13})	200.73	2.08	0.25	0.40	0.40	0.16	-	70.18***	1/371
2. Mother education (X_4)	185.87	5.25	1.27	0.19	0.44	0.19	0.03	45.16***	2/370
3. Teacher encouragement (X_{12})	167.70	0.48	0.15	0.15	0.47	0.22	0.03	34.02***	3/369
4. Mother income (X_8)	167.08	6.04	2.40	0.12	0.48	0.23	0.01	27.46***	4/368

C = Constant; β= Regression coefficient; SEβ = Standard Error of Regression Coefficient ; Beta = Standard regression coefficient; df = degrees of freedom; *** = Significant at 0.001
Note: Sex (X_1); Age (X_2); Father Education (X_3), Occupation (X_5), and Income (X_7); Mother Occupation (X_6); Medium of Instruction (X_9); and Type of the school (two Dummy variables-TS-Boys (X_{10}) and TS-Girls (X_{11})) were not entered in the equation.

In the first step, school activities (X_{13}) contributed 16% of the variance. In the second and third steps, mother's education (X_4) and teacher encouragement (X_{12}) as perceived by the students contributed another 3% each. In the final step, mother's income (X_8) was entered, providing an additional 1% contribution. The total contribution of all these independent variables yielded a maximum contribution of 23% for the prediction of creativity in students.

The above regression analysis suggests that school activities, mother's education, teacher encouragement and mother's income are the most important factors in determining a student's creativity. The correlations of the above factors with creativity were also very

[6] If six 'liking subjects' and 'disliking subjects' were included, five vectors would be needed for each set.

high and significant above the 0.001 level; they were 0.40, 0.18, 0.23 and 0.16 respectively.

In the next stage, school activities were regressed on all variables (excluding creative thinking). The result of the multiple regression is presented in table 11.18.

Table 11.18 Multiple Regression with school activities as the dependent variables

Variables in the equation	C	Unstandardised Regression coefficient		Standardised Regression coefficient	R	R^2	Increment in R2	F-ratio	df
		β	SEβ	Beta					
1. Medium of Instruction (X_9)	26.05	-5.18	0.70	-0.36	0.36	0.13	-	55.40***	1/371
2. Type of school dummy (TS-Boys-X_{10})	26.04	7.07	1.09	0.33	0.47	0.22	0.09	51.91***	2/370
3. Sex (X_1)	28.58	-5.81	0.76	-0.40	0.57	0.33	0.11	59.48***	3/369
4. Type of school dummy ((TS-Girls-X_{11})	27.73	5.60	1.15	0.36	0.61	0.37	0.04	53.33***	4/368

C = Constant; β= regression coefficient; SEβ = standard error of regression coefficient ;
Beta = standard regression coefficient ; df = degrees of freedom; *** = significant at 0.001

The results indicate that medium of instruction contributed 13%, and type of school (dummy TS-boys-X_{10}) 9% of variance in the organisation of school activities. Sex and type of school (dummy TS-girls-X_{11}) contributed another 11% and 4% respectively. Altogether the variance explained by the four variables on school activities was 37%.

In the next stage, teacher encouragement was regressed on the remaining variables, which were expected to have significant effects on it. Table-11.19 reveals that five

Table 11.19 Multiple Regression with Teacher Encouragement (TES) as the dependent variable

Variables in the equation	C	Unstandardised Regression coefficient		Standardised Regression coefficient	R	R^2	Increment in R2	F-ratio	df
		β	SEβ	Beta					
1. School activities (X_{13})	39.74	0.30	0.08	0.19	0.19	0.04	-	13.77***	1/371
2. Type of School Dummy TS-Boys-X_{10}	39.77	4.00	1.75	0.12	0.22	0.05	0.01	9.58***	2/370
3. Sex (X_1)	41.66	-3.66	1.34	-0.16	0.26	0.07	0.02	8.99***	3/369
4. Medium of instruction (X_9)	47.20	-4.29	1.60	-0.19	0.29	0.09	0.02	8.66***	4/368
5. Father education (X_3)	45.01	0.80	0.80	0.11	0.31	0.10	0.01	7.95***	5/367

C = Constant; β= regression coefficient; SEβ = standard error of Regression coefficient ;
Beta = standard regression coefficient ; df = degrees of freedom; *** = significant at 0.001

variables had a significant effect on teacher encouragement. School activities contributed 4% of the variance, sex and medium of instruction contributed 2% each; and type of the school (dummy boys-X_{10}) and father's education (X_3) added another small contribution of 1% each. Altogether, 10% of the variance was accounted for by these five variables.

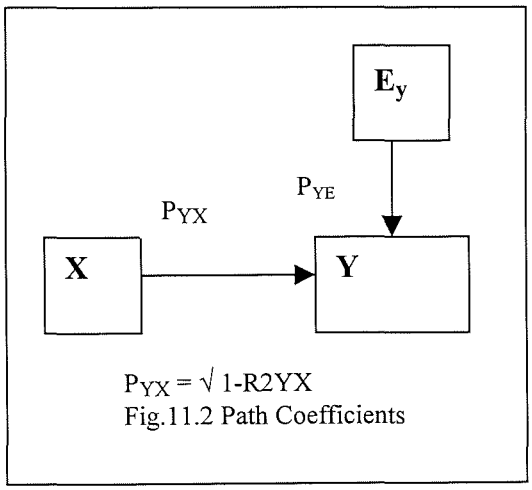
11.9.2.0 Path Analysis

Path Analysis was developed by Sewall Wright as a method for studying the direct and indirect effects of variables hypothesised as the causes of variables treated as effects. In Wright's words:..... "the method of path coefficients is not intended to accomplish the impossible task of deducing causal relations from the values of the correlation coefficients. It is intended to combine the quantitative information given by the correlations with such qualitative information as may be at hand on causal relations to give quantitative interpretations" (Wright, 1934, p.193)

The advantage of using Path Analysis is that it provides a means by which the nature of the problem addressed by an empirical study may be summarised. The path diagram is a useful device for displaying graphically the pattern of causal relations among a set of variables. In the causal model, a distinction is made between *exogenous* and *endogenous* variables. An exogenous variable is a variable whose variability is assumed to be determined by causes outside the causal model. An endogenous variable, on the other hand, is one whose variation is explained by exogenous or endogenous variables in the system.

Path Coefficients: a path coefficient indicates the direct effect of a variable hypothesised as a cause of a variable taken effect (Pedhazur, 1982). The symbol for a path coefficient is P with two subscripts, the first indicating the effect (or dependent variable) and the second subscript indicating the cause (the independent variable). Accordingly $\mathbf{P_{32}}$ indicates the direct effect of variable 2 on variable3.

The assumption about the causal order or direction is explicitly represented by the direction of the arrow, and the assumption of closure is explicitly indicated by the absence of a connecting line between X and the latent variable E_y which represents all the residual



$P_{YX} = \sqrt{1-R2YX}$

Fig.11.2 Path Coefficients

causes of Y. The latter assumption is sometimes called the assumption of independent error or independent disturbances.

Beta weight, express the change in the dependent variable, expressed in standard deviation units, that would be produced by a positive increment of one standard deviation in the independent variable concerned (Kinnear and Gray, 1977, p.262).

The path coefficients can be represented by either the ordinary regression coefficients or standardised betas. It is customary to use the Beta values (Nie and etal., 1975,p.387). The path coefficients represented in the model (Fig.No. 11.3) were Beta weights drawn from the tables-11.17, 11.18 and 11.19. The straight lines with the arrowheads indicate the direction of effect. This usage is partly due to Wright's original formulation and partly due to conveniences of interpretation. It is also customary to estimate path coefficients from latent variables (i.e., all residual causes) associated with X_i by $\sqrt{1-R^2}$, where the multiple R is that part of the regression equation in which X_i is the dependent variable and all causally prior variables are used as predictors.

In this model, X12 and X13 were endogenous variables (or mediating) while the rest of the variables were exogenous variables.

11.9.2.1 Structural Equations

Each endogenous (dependent) variable in a causal model may be represented by an equation consisting of the variables upon which it is assumed to be dependent, and a term representing residuals or variables not under consideration in the given model (Kerlinger and Pedhazur, 1973, p.310). For each independent variable in the equation there is a path coefficient indicating the amount of expected change in the dependent variable as a result of a unit change in the independent variable. The exogenous variables were represented by their residuals (e_1, e_2, e_3.....).

The equations for the ten explanatory variables expressed in the standard score form (Z-score) are:

$Z_1 = e_1$ (1) $Z_3 = e_3$ (2)

$Z_4 = e_4$ (3) $Z_8 = e_8$ (4)

$Z_9 = e_9$ (5) $Z_{10} = e_{10}$ (6)

$Z_{11} = e_{11}$ (7)

$$Z_{12} = P_{12\,1} Z_1 + P_{12\,3} Z_3 + P_{12\,9} Z_9 + P_{12\,10} Z_{10} + P_{12\,13} Z_{13} + e_{12} \quad (8)$$

$$Z_{13} = P_{13\,1} Z_1 + P_{13\,9} Z_9 + P_{13\,10} Z_{10} + P_{13\,11} Z_{11} + e_{13} \quad (9)$$

$$Z_{14} = P_{14\,1} Z_1 + P_{14\,3} Z_3 + P_{14\,4} Z_4 + P_{14\,8} Z_8 + P_{14\,9} Z_9 + P_{14\,10} Z_{10} + P_{14\,11} Z_{11} + P_{14\,12} Z_{12} + P_{14\,13} Z_{13} + e_{14} \quad (10)$$

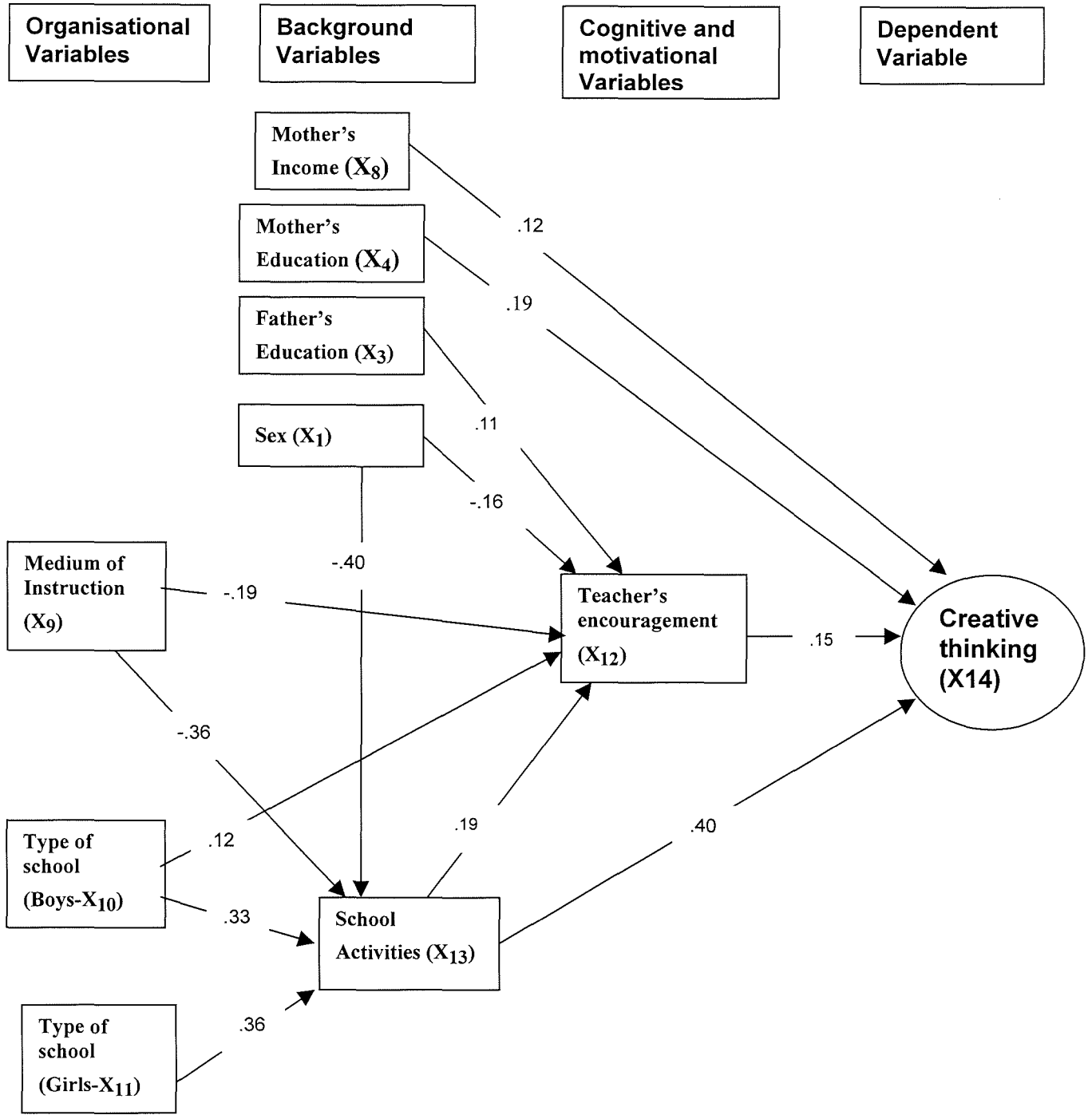


Fig. N0. 11.3: A Model for the correlates of creative thinking

Note: Age (X_2), Father occupation (X_5), Mother occupation (X6) and Father income (X7) were not included in this model because they were not entered in the multiple regression equations.

The direct and indirect effects of the independent variables on creative thinking were calculated and are presented in Table-11.20.

Table 11.20: Summary of direct and indirect effect of explanatory variables on creative thinking (CT)

Variable	Zero order correlation	Equation for the correlation with creative thinking (with composition of the path coefficients				
		Direct Effect	Indirect Effect	Direct Effect	Indirect Effect	Total Effect
1. School activities (X_{13})	0.40	$r_{13\,14} = P_{14\,13}$ = .40	+ $P_{12\,13}P_{14\,12}$ + (.19) (.15)	0.40*	0.03	0.43*
2. Mother's Education (X_4)	0.17	$r_{4\,14} = P_{14\,4}$		0.19*	0.00	0.19*
3. Teacher's Encouragement (X_{12})	0.23	$r_{12\,14} = P_{14\,12}$		0.15*	0.00	0.15*
4. Type of the school (Dummy TS- Girls-X_{11})	-.05	$r_{11\,14} = P_{14\,11}$ = -0.011	+ $P_{13\,11}P_{14\,13}$ + (.36) (.40)	-0.01	0.14*	0.13*
5. Mother's Income (X_8)	0.16	$r_{8\,14} = P_{14\,8}$		0.12*	0.00	0.12*
6. Type of the school (Dummy TS- Boys- X_{10})	0.03	$r_{10\,14} = P_{14\,10}$ = -0.048	+ $P_{12\,10}P_{14\,12}$ + $P_{13\,10}P_{14\,13}$ + (.12) (.15) + (.33) (.40)	-0.05	0.15*	0.10*
7. Father's Education (X3)	0.15	$r_{3\,14} = P_{14\,3}$ = 0.0344	+ $P_{12\,3}P_{14\,12}$ + (.11) (.15)	0.03	0.02	0.05
8. Sex (X_1)	0.05	$r_{1\,14} = P_{14\,1}$ = 0.084	+ $P_{12\,1}P_{14\,12}$ + $P_{13\,1}P_{14\,13}$ + (-.19) (.15) +(-.40) (.40).	0.08	-0.19*	-0.11*
9. Medium of Instruction (X_9)	-.12	$r_{9\,14} = P_{14\,9}$ = -.0269	+ $P_{12\,9}P_{14\,12}$ + $P_{13\,9}P_{12\,13}P_{14\,12}$ + (-.19) (.15) + (-.36) (.19) (.15)	-0.03	-0.04	-0.07

Note: Age (X_2), father occupation (X_5), mother occupation (X_6), and father income (X_7), were not included in this model because they were not entered in the multiple regression equations.

The table shows that school activities had a significant and direct effect (.40) on creative thinking. The indirect effect of this variable was very minimal (0.03), even though it mediated between CT^+ and other exogenous variables. Mother's education and teacher's encouragement had significant direct effects on creative thinking, .19 and .15 respectively but no indirect effect was found for these two variables. Teacher's encouragement is a mediating variable for many exogenous variables. It also had an indirect influence on CT^+. The other variable, mother's income, also directly and significantly affected CT^+, but it had no indirect effect on CT^+.

Type of school (girls) had a small non-significant direct effect on CT but it exerted a significant indirect effect through school activities, with the result that the total effect of this variable was significant (.13). Similarly type of school (boys) had also a small non-significant direct effect, but it exerted a significant indirect effect through teacher's encouragement and school activities. Therefore the total effect was significant (.10).

Sex had a non-significant direct effect on CT^+, but an indirect effect through school activities and teacher's encouragement was significant. The total effect of sex was

significant (-.11). It indicated that boys have been found to score higher in creativity than girls. Father's education and medium of instruction had neither direct nor indirect effects on CT. Their total effects were also not significant.

To summarise all variables included in the model, creative thinking (X_{14}) seems to be largely influenced by activities organised in schools (X_{13}), mother's education (X_4) and teacher's encouragement (X_{12}), and is moderately influenced by type of school (TS-Girls-X_{11}), mother's income (X_8), type of school (TS-Boys-X_{10}) and sex (X_1). Father's education (X_3) and medium of instruction (X_9) seem to have non-significant effects on creative thinking. The total variance explained in this exploratory model was 23%. The variance explained is less than it might have been, because of non-inclusion of some factors, for example students' cognitive and motivational factors.

11. 10 Summary

In this chapter the teacher encouragement scale was analysed, revealing that pupils' perspectives on teacher encouragement fall into 6 main factors: teacher-pupil relations, teacher initiation, classroom organisation, teachers' attention, creating interest and strict control. Scores on pupils' perceptions of teacher encouragement were related to measured creativity, suggesting that teacher behaviour may have an effect on creativity. An analysis was also undertaken of the extra-curricular activities provided by schools which may promote creativity. Differences were found between schools in the extent to which these activities were provided.

Multiple regression analysis and path analysis were undertaken to determine the relationships between the variables measured and creative thinking. A multiple R of .48 was obtained in regressing school activities (0.40), mother's education (0.19), teachers' encouragement (0.15) and mother's income (0.12) on measured creative thinking. The more sophisticated model developed through path analysis demonstrated the direct influences of other variables on school activities and teacher encouragement. These included father's education, sex, medium of instruction and type of schoolboys or girls.

The final chapter of the thesis will discuss these findings.

Chapter XII

Summary, Conclusions, Implications and Suggestions

12.1 A brief summary of the study

The present research is an attempt to explore the promotion of creativity among secondary school students in India, particularly in government schools in the state of Andhra Pradesh. The research was designed to look at government schools in greater detail than had previously been the case, because the literature survey revealed that these schools were under-performing not only in relation to academic performance but also in developing creative abilities among the students when compared to private school students.

The arguments for the development of creativity among school students, the place and importance of creativity in education and the need for the present investigation were discussed in chapter I. Definitions of creativity and the variety of meanings attached it to were also analysed. Theoretical approaches were briefly presented in chapter II, and the succeeding chapters (III to V) considered the relevant literature in the field of creativity and its development in students. These chapters addressed the issues of the measurement of creativity and related factors, for instance, age, grade, sex, SES and type of the school (Chapter III); creativity and the role of the school (Chapter IV); and creativity and the role of the teacher (Chapter V).

The main purposes of the study were to examine students' performance in creative thinking ability in relation to selected variables, and to consider teachers' views and attitudes towards the development of creativity. The study also examined teachers' behaviour as perceived by their students and activities organised in schools to promote creativity. The main aims of the research were as follows:

Aims In brief

To explore

1. **Indian teachers' views of creativity and how it can be developed.**
2. **Whether differences exist in measures of creative thinking, as measured by Prof. Baqer Mehdi, in relation to students personal background variables, cognitive and motivational variables and organisational or school variables.**
3. **Students' perceptions of their teachers' classroom behaviour and teaching methods.**
4. **What activities are organised by schools in order to promote creativity.**
5. **Whether an exploratory model can be developed to describe the relationships between students' personal background variables, cognitive and motivational variables and organisational variables.**

The data was collected by using a set of eight tools. Two tests of 'Creative Thinking' (Verbal and non-verbal) constructed and standardised by Baqer Mehdi (1973, 1985) on rural and urban samples in India were adopted for the study. The

Student Information Sheet (SIS) was devised to collect students' background data; the Teachers' Encouragement Scale (TES) measured the degree of encouragement given by the teachers as perceived by their pupils. The Teacher's Questionnaire (TQ) and Interview schedule for Teachers (ISFT) were developed to explore teachers views on creativity (see Chapter VI). A Classroom Observation Scheduled was developed for the purpose of classroom observation but due to technical problems this data was not analysed. In addition to this, information regarding 'out of school activities' was collected from the schools through a checklist developed for the head teachers.

These instruments were drafted in English and translated into the Telugu language, which is the official language of the state of Andhra Pradesh. After the development of the research tools, the researcher conducted a pilot study on a small sample (N=75) from one government high school having both teaching media, English and Telugu, to test the feasibility of the research questions and the clarity of the instruments (Chapter VII). Item responses were carefully examined to see how the respondents performed. Accordingly, modifications were made to the instruments. In the item analysis of TES a Chi-square (X^2) test was applied. From the TES two items were dropped from the main study, due to the non-significant values for those two items.

Drawing on the literature review of creativity and the pilot study experience, the researcher developed a framework for the research, where the variables were classified as Organisational Variables (OVs), Background Variables (BVs), and Cognitive and Motivational Variables (CMVs).

A survey approach was used for the investigation. The sample for the main study was selected in two stages. In the first stage, the selection of schools was made. In stage two, students and teachers were chosen from the selected schools. A total of nine schools was selected from the current list of the government high schools in Hyderabad (Andhra Pradesh, India) by applying a stratified sampling technique. All subject teachers teaching for standard nine, and all the students of standard nine, were included in this study, if the school had one class of students. In the case of more classes in the school, a random number selection procedure was followed.

From the above process, a total of 373 students and 88 teachers was selected. The students' sample included both boys (N=147) and girls (N=226) studying in government boys', girls' and co-educational schools. The teachers' sample comprised 25 males and 63 females (Chapter VIII).

To establish the reliability and validity of the instruments, various methods were applied. The test-retest reliability coefficients for the verbal and non-verbal tests of creativity (including their components) were high, ranging from 0.856 to 0.970 and 0.88 to 0.918 respectively. The item validity coefficients were highly or moderately correlated with the activity and grand total scores (the 'r' values significant levels ranged from 0.05 to 0.001). There was also a high level of correlation between activities and verbal creativity scores ('r' ranged from 0.58 to 0.86). Similarly, a high relationship was found between activities and non-verbal creativity ('r' form 0.40 to 0.80). Factor validity of verbal and non-verbal creativity was established by correlating scores with factors. All the correlations were highly significant.

A Cronbach's Alpha was used to estimate the reliability coefficient for the Teachers Encouragement Scale (TES). It was found to be 0.75. The method of Spearman-Brown Split for reliability was also adopted. The reliability coefficient for the whole test was 0.70, which indicated internal consistency. The intrinsic validity of the TES was found to be 0.84. In addition content validity and construct validity were also established. For construct validity, all the items were correlated with the total scores of TES. They ranged between 0.23 and 0.58.

A more detailed analysis to examine the construct validity of the TES was attempted through factor analysis of all 20 items. Firstly, the Principal Component Analysis (PCA) was employed, to extract the latent trait or the underlying factors of the 20 TES items. This was followed by the most common method, Varimax Rotation, to maximise the relationships between the variables and some of the factors.

To establish the reliability of the interview data , an inter-rater reliability method was adopted. The reliability and validity of the Teachers' Questionnaire were established by monitoring the clarity of directions and the wording of questions. A factor analysis was also performed to provide evidence for construct validity.

The data was analysed by applying various quantitative and qualitative approaches. Various statistical techniques[1] were employed in the analysis of the data, and the results were presented in Chapters IX through XI.

[1] 1). Categorisation and Comparisons. 2) Simple statistics: Frequencies, percentages, date representation through the Graphs etc., 3) Descriptive statistics: Mean, Median, Mode, Standard Deviation (SD), Standard Error of Mean (SE_M), Skewness, Kurtosis. 4) Chi-square (X^2) test. 5) Product moment correlation of coefficient (r). 7). t-test analysis (Critical Ration (CR)). 8). Analysis of Variance (ANOVA or F-ratio). 9). Multiple Regression Analysis (Multiple 'R'). 10) Factor Analysis. 11). Path Analysis

12.2.0 Findings, conclusions and discussion of the results of the study

12.2.1 Towards a model of creative thinking

A major focus of the study was identifying the variables most influential on creative thinking ability with a view to representing a model of the correlates of creativity among secondary school students in India. The method adopted was 'path analysis' chosen to study the direct and indirect effects of variables and display graphically the pattern of relations among the selected variables. The purpose of Path Analysis was to explain to, specify and quantify the effects on selected variables on creative thinking.

To construct the model, a regression analysis was undertaken. The result showed that when school activities were entered first, the multiple correlation coefficient (R) was .40 (16% of variance). In step 2 and step 3, mother's education and teacher encouragement contributed another 3% each. In step 4, only 1% was contributed by mother's income level. Altogether the variance explained by the four variables on creative thinking ability was 23%. School activities (X_{13}) and teacher encouragement (X_{12}) were found to mediate between the exogenous variables and creative thinking ability.

Overall, creative thinking (X_{14}) seems to be directly and largely influenced by activities organised in the schools (0.40), mother's education (0.19) and teacher encouragement (0.15), and mother's income (0.12). It is indirectly influenced by type of the school -TS-girls (0.14), type of the school -TS-boys (0.15) and sex (-0.19). In the model, father's education (0.05) and medium of instruction (-0.07) seem to have non-significant effects on creative thinking, although these emerged in a comparative analysis. In the next sections these various aspects will be considered.

12.2.2 Teachers views and attitudes towards creative thinking

The majority of Indian teachers reported that the topic of creative thinking was included in their teacher training, mainly under the auspices of Educational Psychology. In the Fryer (1989) study, the majority of British teachers who recalled creativity development being included in their training said that this was in the arts (Fryer, 1996, p.3). The Indian teachers reported that creativity was hardly included in the arts. Art education remains one on the most neglected areas of the school curriculum in India (Raina, 1989; Raja Gopal, 1967; Singh, B. S, 1991) and in teacher training colleges.

The results obtained in this study indicated that very few teachers received training in creative thinking. There is a need to improve competency and knowledge of creativity through full time courses or in-service training. It is worth noting the suggestion made by the Review Committee of NPE'86 (1990):

> Re-organise the teacher training programmes with a view to equipping the teachers with an understanding of how to identify and nurture children with special talent or aptitude within the same classroom. A special emphasis would need to be given to enable talented children to develop at a faster pace in both scholastic and non-scholastic domains in every classroom in ways that encourage a non-competitive environment (p.108). There is no provision for organised and periodic in-service education of teachers. In-service programmes are not effectively done; there is poor co-ordination and monitoring of in-service education programmes. Catering for all types of students during teaching practice is not taken care of (pp.300-301).

The research (table 9.5) revealed that there is a need to organise special training programmes, conferences, seminars and symposia, orientation and refresher courses, workshops, books and journals for teachers in order to update their knowledge and understanding of the development of creativity among students.

The overall knowledge and understanding of the teachers with regard to creativity seems to be good. They also have positive views and attitudes. Their knowledge is very limited about the use of creative techniques in the classroom, for instance brainstorming, and synectics. Their training needs centre on being able to apply creative techniques in normal classrooms while teaching. For that, they need demonstrations, workshops, and model lessons in particular subjects which focus on developing creativity in the child.

The conceptions of creative thinking of the Indian teachers in the study were similar to those identified among British teachers by Fryer (1989). Creativity was seen as inspiration, imagination, having original ideas and self-expression by both groups. The Indian teachers viewed creative thinking as a process, divergent thinking and innovation. Unconscious processes were ranked lowest. It seems that like British teachers, the Indian teachers' view is closer to the humanistic rather than the psychoanalytic approach.

From the interviews and questionnaire analysis, it was apparent that the teachers were also able to distinguish between creativity and intelligence. Almost all the teachers perceived that intelligence and creativity were different. They perceived intelligence as synonymous with convergent thinking and creative thinking with divergent thinking. The teachers' way of thinking reflects the work of Guilford (1968), Wallach and Kogan (1965) and Getzels and Jackson (1962). They also perceive that intelligence is a skill whereas creative thinking is 'imagination'.

All the teachers recognised the importance of creativity in education, in the interviews and in the Teachers' Questionnaire. In their view, emphasising the importance of the development of creativity assists pupils in meeting challenges, solving day-to-day problems, developing independent thinking, and bringing out

hidden talents (see table 9.9). Besides these, in the interview data other interesting reasons were found for developing creativity. They were:

-helping children to adapt and improve themselves in an ever-changing environment and meet the challenges of the world.
- achieving certain goals of life in the field of education
- developing thinking ability, increasing imagination, and acquiring novel views.

The research has revealed that creativity can be developed through teaching by adopting a variety of methods; for example, by providing students with new problems to generate new and unfamiliar solutions, through the improvisation of apparatus, by asking divergent questions in teaching, giving more scope to students to ask questions, through training in activities or organising programmes, through visual aids, discussions and telling life-histories of great persons. In the interview data analysis (9.2.11), other techniques to be adopted in the classroom were outlined. They were:

- showing experiments, film strips,
- organising cultural activities, games & sports, writing songs, literary & singing competitions;
- forming Science, Mathematics, Literature and other subject clubs;
- presenting children with some unreal situation and asking what would be the result;
- presenting unstructured stimuli to the students to encourage them to structure them or promote open-mindedness;
- adopting innovative methodology by the teachers.

Beetlestone (1998) argues that there are two types of teachers. Type one teachers see creativity as a rare and original gift which few children possess. They look expectantly for the spark of creative genius. They know they themselves are not creative geniuses, but they are ever hopeful for their pupils. The second type of teacher sees creativity all around them in everyday activity (p.94). We can see both types of teachers in the present study. About fifty percent of the teachers disagreed with the possibility of developing creative thinking in all children. The remainder agreed that creativity could be developed in all the children, but certain conditions had to be fulfilled. They believed that it depended on many factors: the school environment, living conditions, teachers' encouragement, and the co-operation of parents.

In response to the question, Are all intelligent students creative? About 50% said *'no'* and 20% said '*Not always'*. As one teacher said, '*it need not be true!* Another said *'All intelligent students may possess at least some creativity'*. Another teacher expressed concern that highly intelligent children get good marks, but creative children achieve less because their divergent ideas lead them to lose interest in academic achievement.

The results indicate that the majority of teachers were able to identify creative children in their normal classroom teaching. The criteria they gave in the interview and questionnaire was discussed in detail in chapter IX (section 9.2.8 and table 9.8). They were also positive about encouraging the children in their classrooms to be creative. The teachers' methods of encouraging creativity in the classroom were presented in chapter IX (see 9.2.10 and table 9.10). No significant differences were found in teachers' attitude

towards the encouragement of students' creativity development in relation to demographic factors like sex, age, experience and educational qualifications (see table-9.15).

Comparing Indian teachers' views with the British teachers studied by Fryer (1996, p.75) with regard to the factors assisting in the development of creativity first in both cultures was 'building self-confidence'. Having a creative teacher was viewed by both groups as second and third respectively. Indian teachers perceived good pupil relations, encouraging experimentation, and developing curiosity as important factors. They did not believe that 'informal teaching' assists in developing creativity (table 9.11). It is obvious that in a formal traditional teaching system, particularly in India, the teachers are restricted to working within the boundaries or within the framework of the curriculum. So the teachers might be accustomed to teach formally rather informally.

The study showed that Indian teachers are often enthusiastic to develop creativity among their students, but they fail to do because they find many obstacles at various levels, teacher, student and school. The major obstacles at teacher level were found to be the overloaded syllabus, the stress on completion of the syllabus, an over-emphasis on preparing the students for examinations, a heavy teaching work load, a lack of time, lack of recognition and appreciation of teachers' work, great emphasis on the lecture method and inadequate training in creativity and its development.

The teachers believed that the obstacles at students level were: the students 'lack of experience and their participation in the classroom as passive, silent spectators; a tendency to rote learn; a lack of motivation; general poor performance; unequal aptitudes; poor family background; no parental care or encouragement; and parental illiteracy.

The teachers reported, as constraining at school level, obstacles such as inadequate resources, instructional materials, conflicts with curricular demands, unsuitable accommodation and inadequate funds. In the interviews, obstacles identified were lack of time for teachers, an overloaded syllabus, short periods (short time for lessons), lack of laboratory facilities, government policies, lack of knowledge among the administrators, pressure on teachers for completion of the syllabus, and other distractions from teaching like enumeration, and frequent election duties.

Surprisingly, the results are similar to the those from the British teachers (Fryer, 1996, p.101). Inadequate resources, inadequate preparation time, over-large classes, excessive non-teaching workload, excess teaching load and unsuitable accommodation were major obstacles reported in British educational institutions.

Some validation of the Indian teachers' reports comes from observations made by the researcher inside and outside of the classroom during the fieldwork. Classrooms were often congested or overcrowded, and there was a lack of furniture (see Pictures 2(a, b & c); 5 (a)). In some schools the girls and boys sit on benches with desks while in others they sit on the floor, without desks to write on (See Pictures 3(a & b); 5 (b & c); 2 (a, b & c)- in Appendices). No electrification was found in the majority of the schools. In some schools the power supply was stopped because of overdue bills. Some schools do not even have proper toilets, and if they exist they are not always properly maintained. Students do not have a place to eat their lunch-packs and they have to bring their own water bottles. They often eat their lunch in the classroom, on the school ***Verandas*** or in the playgrounds (see Pictures from 4(a) and 4(b) in Appendix).

The present study reflects the findings of the survey results of the World Education Report (UNESCO, 1998) in fourteen countries[2]. In the majority of the countries surveyed, the average classroom is not much more than a designated meeting place for a teacher and a group of pupils: in 10 out of the 14 countries, one third or more of the pupils were gathered into classrooms without a usable chalkboard and without a teacher's table. The situation is only marginally better with respect to a chair for the teacher. In virtually all countries there are no teaching aids such as wall charts, and almost no pupil will ever see a world map. In 8 out of the 14 countries, 90% of the pupils attend schools which do not have electricity; almost as many attend schools without piped water and one-third or more of the pupils attend schools which do not have any water at all. In over 90% (mainly in Africa) the pupils do not have a desk or writing place, as distinct from just a place to sit (p.55).

As the World Education Report (UNESCO, 1998, p.55) pointed out, "if education is to be expected to help the poor to lift themselves out of poverty, then in the poorest countries education itself needs first to be lifted out of poverty". From this perspective, structural adjustment programmes designed to eliminate wastage in public service could usefully be complemented by investment in the physical infrastructure of education: providing schools with water and electricity and reasonably solid walls and roofs, plus furniture and of course textbooks and other teaching materials.

The school curriculum has a central place in the process of schooling. It is necessary to emphasise that a school curriculum is not just a syllabus where the contents are fitted into a timetable for the purpose of teaching and learning. The school

[2] Bangladesh, Benin, Bhutan, Burkina Faso, Cape Verde, Equatorial Guinea, Ethiopia, Madagascar, Maldives, Nepal, Togo, Uganda, U. Rep. Of Tanzania and Zambia.

curriculum should be seen as a series of planned activities, which result in learning, and in which the teacher plays a crucial role. The learning activities take place mainly in school but can often be extended to home and community (Thomas, 1994).

This extended view of the curriculum gives the role of schooling, and its relationship with the cultural development of the community, a pivotal position in linking the culture of the school and that of the community. In this sense it may be argued that the school curriculum has an even more central part to play in the interrelationship between educational and cultural development (Ibid. p.38).

Thomas argued in his curriculum learning model[3], that curricula should be planned according to the cultural context of the learner including the learner's preferred language, family background, religious persuasion, styles of thinking as well as reference to certain cultural customs which might affect a child's learning set.

Thomas argues that cultural customs should be considered while preparing the syllabus. Similarly, in India, Singh, B.P (1991) argues that "the culture, the customs and the community environment must be reflected in the curriculum and it must help the student in developing skills, interests and habits which may be helpful to them as individuals and for the society in which they will have to live"(p.36). Unfortunately, in India, this is often not the case. The contents from developed countries and cultures are adopted without filtering and are often culturally out of context and irrelevant. For instance, Srivastava (1994) has argued that "the textbooks are not written from the child's viewpoint and its contents are irrelevant. Even the textbooks used for teaching of mother tongue are written in such stylised diction that the children cannot be expected to see the language used in them as their own" (p.17). Moreover, it is restricting the teachers to work within the boundaries or framework. The time is also very limited for teaching of subjects within the time; also there are so many unexpected holidays[4]. This may cause delays in covering the syllabus, and may force the teachers to finish the syllabus with greater speed.

The present curriculum in Andhra Pradesh was criticised by the teachers. Most of the teachers expressed the view that the secondary school curriculum is not only rigid and overloaded in all or most of the subjects, but also leaves no room for creative students to express or display their talents. It is not suitable to cater for the needs of a wide range of learners and their learning environment. No scope is given to students'

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[3] A Curriculum Learning Model comprises three inter linked elements. They are Learner Background, Learner-Teacher Interaction and Learning Outcome (p.39).

[4] Students or teacher strikes, communal and rivalry violences, disasters, conducting regular and frequent exams in the school and the Public examinations (SSC, Intermediate)

self-evaluation and self-initiation of learning. It is completely examination-oriented. The methods are not appropriate to develop creatively. The curriculum emphasis is on knowledge acquisition rather than attempting to develop independent thinking. Nonetheless, the teachers prefer an activity centred and child centred approach in the curriculum.

The NPE'86 Review committee (1990) made the same observation:

"The problem faced by school education in today's context is near-exclusive emphasis on knowledge through theory alone. Even when theory is taught, its teaching remains barren and partial due to the pedagogic constraint of divorcing knowledge from practice. The accent is to be on integration of theoretical knowledge with skills, attitudes, productive work, social responsibility and creativity. Education is to be linked with the emerging problems of the world of work. For this purpose, the method of project work should be an integral feature of the educational process"(p.211).

A teacher of mathematics rightly remarked about the mathematics syllabus: *'I don't think it suitable for developing creative thinking. Mostly the child has to reproduce only the formulas and apply the formulas to solve the problems and is not given any scope to apply new knowledge or new ways of thinking to solve the problems'.*

The present study revealed in the interviews that the teachers are compelled to rush through the syllabus to complete it. They are keen to encourage creativity and would like extra periods to undertake some creative work. The time given for teaching the subject content is itself inadequate. Each subject teacher needs at least one period per week on a rotation basis to work together with students and the resource teacher in the resource room. Teachers and students would enjoy the benefits of a flexible schedule (no pressure and hurry in completing lessons). Working with resource and subject teachers, students would get more benefit from exchanging their views in an informal way, and enjoy the experience of teaching in two different environments[5]. They could explore and discover independently or collaboratively from all kinds of resources available to them.

All the teachers were dissatisfied with the present examination system and practices in the schools. A male teacher of English said, '*Examinations are bookish, no room for creativity'*. One teacher blamed what students learn through out the year. "*They have to just vomit it out in just two and half-hours"*. The teachers also said that the questions were straightforward, and responses could be rote memory based. These examinations do not take account of creativity, or properly evaluate students' creativity. The teacher of physical sciences said, *'I observed some instances where the teachers strike off the answers without kindness, if students write answers in a creative way'.*

[5] Two different settings are 1) The normal classroom and 2) the Resource Room

It is clearly understood that there is a need for modification in the entire evaluation system, providing a climate in which external evaluation is sometimes absent. "Evaluation is always a threat, always creates a need for defensiveness, always means that some portion of experience must be denied to awareness (Rogers, 1959, p.79). External evaluation is threatening and as a result tends to shut off from awareness some area of experience. This reduces a person's ability to think beyond the obvious, the safe, the familiar (Torrance and Myers, 1974, p.105). Instead of asking closed questions, open-ended questions should be included to elicit more explanations and a greater variety of responses from the students rather than insisting on single responses. In the final result, the performance of the whole year in various activities should be considered, instead of only examination marks.

The headteacher should also attempt to make his/her teachers realise that they are respected not only as individuals but also as important partners in the development of the school. There must be a feeling of general acceptance, respect and support among the headteacher and teachers (Raja Gopal, 1972). The headteacher should provide opportunities for the teachers to work together in planning programmes for the improvement of instruction.

One of the teachers argued in the interview that knowledge of creativity is essential for educational administrators at the highest level and head teachers at school level. They must realise the importance of creativity. Only then will they take appropriate measures to develop creative skills to assist the child in his future life.

12.2.3 Students' performance in creative thinking and its relations with selected variables

The study revealed that the majority of the students studying in government schools came from poor and disadvantaged backgrounds. Poverty compels parents to send their children to government schools since they provide a completely free education! The pupils' fathers had hardly completed school education (about 75%) and about 7% were illiterates. Of the mothers 94% had completed secondary education or less, but about 26% were illiterates. Their parents were unemployed, production and transport operators, clerical and related workers or service and related workers. About 84% of the mothers were housewives or dependants. A small percentage of fathers (6.4%) and mothers (only 2.4%) were doing professional jobs. Their income levels indicate their poverty. 70.5% of mothers earned nothing. They were housewives.

Due to poverty, poor families require children to work looking after animals or taking care of younger siblings. On some occasions, children need to share the responsibilities of parents, This may force the students to drop out of school. This

constitutes a major problem for the government. Review Committee NPE'86 (1990) observed that *"among poor families, the economic role of the girl child and her responsibilities in the household are obstacles to schooling" (p.29)*. The education of girls is in a very real sense linked to the availability of water, fuel, fodder and child-care facilities for individual families. As much as 29% of the entire time of a girl-child in rural areas is spent in the collection of fuel, and 20% in fetching water. Care of siblings also accounts for a significant proportion of a girl's time. This is particularly so in poor families. For instance, it was observed that in eastern UP, 30% of the household burden and 20% of the agricultural work is shared by girl children (p.31).

The issue of gender is especially interesting in this study, in that girls and boys were not significantly different in creative thinking (in composite scores). But in relation to originality (verbal and non-verbal) girls performed more poorly than boys ($p < 0.05$ and $p < 0.01$ respectively). These results are similar those of Badrinath and Satyanaryana (1979). As far as non-verbal elaboration was concerned, girls were found to be better than boys ($p < 0.05$). Similar results were also reported by Singh (1978).

In this study, the creative thinking of the students fluctuated according to their age. The same observation was made by Torrance (1962) and Kishore (1981). The mean scores gradually increased from 12 to 14 years of age, declined at the age of 15 years, then recovered for age 16. A setback again took place for the 17 years age group.

Torrance (1962a, pp. 98-100) explains that between the ages of 14 and 16 much imaginative activity seems to be focused on a future career. Interests and aptitudes are developed rapidly, but are still rather unstable. Pupils worry about peer acceptance, and fears cause them to avoid situations which involve exploration or testing of their abilities.

The home influence is a significant factor in encouraging the development of creative thinking (Weisberg and Springer, 1967, p.120-134). Home is the centre of learning and family is the contributing agent to child's creativity. Suitable parental care and encouragement of the children will definitely enhance creativity.

There are many studies which indicate that the SES of the students is directly proportionate to creativity (see 3.5.4 in chap.-III). In this study, father's and mother's occupations did not influence their children's creativity. Regarding parents' education, the findings of the present study the results of Raina (1968), Srivastava (1977), Singh (1980), Mukhopadyay, Chakrabarti and Kundu (1990), and Sudhir Kumar (1992), who found that where parents had a higher level of education this was a favourable factor for the development of creativity in their children. Analysis of variance revealed different

effects of father's education level ($p<0.05$) (table 10.9) but in the multiple regression analysis it neither influenced directly nor indirectly. Multiple regression analysis showed that mother's education and income showed a direct and significant effect on their children's creative thinking (see the exploratory correlate model; tables 10.10 and 10.14).

As King (1990) argues, "a more educated mother raises a healthier family; she can better apply improved hygiene and nutrition practices. She may have fewer and better-educated children, she is more productive at home and in the workplace and is better able to get further education". Women's enhanced ability to earn an income to support their families is becoming increasingly important, as more become heads of households and enter the labour force in search of paid work. "Indeed, failure to raise women's education to a par with men's exacts a high development cost- - in lost opportunities to raise productivity and income, and improve the quality of life". The level of schooling that women have achieved is only one aspect of female education affecting a country's development (p.1).

If the intention of the government and the schools is to develop the competency of the students attending them then they should jointly plan at least some programmes for educating and assisting in improving the earning power of women. In this process, voluntary organisations can also be encouraged to play an important role as catalyst between Government, school and parents. If necessary some classes at the weekend may be arranged to educate women in small-scale[6] industries and marketing.

While this may put an extra burden on schools, it may be worthwhile for the future. It may also encourage parents to show concern and regard for the school. They may come forward to help the school in many ways. It will also help in developing rapport with the school. The responsibility of the school is not only to teach the children it should also hold responsibility for building and developing the nation.

Two major issues facing parents concern whether to send their children to a school with English or Telugu as the medium of instruction, and to what type of school they should send the girls, single sex or co-educational. In India it is very expensive to send children to English-medium schools. However, Naidu (1987) reported that the students who were studying in English medium proved to be better achievers than Telugu-medium students in academic subjects. In this study, the teachers did not perceive the medium of instruction as an issue, although the study suggests that the Telugu-medium students have been observed to be more creative (overall) in comparison to the English medium students ($P< 0.05$) on creativity (composite score). It seems possible that

[6] Garments, knitted goods and laces, pickles, jams, tomato-sauce, butter, cheese, curd, snakes and sweets.

the English-medium students were handicapped in expressing their flow of ideas (fluency) and variety of ideas (flexibility). No significant differences were found in uncommon or unique responses (originality). Although both students in both media have come from a bilingual background, the students taught in their mother tongue (Telugu) have an advantage over others in expressing their ideas fluently.

Studies have shown that bilingual children, relative to monolingual controls, show definite advantages on measures of "cognitive flexibility", "creativity" or "divergent thought" (Torrance et al, 1970; Ben-Zeev, 1972; Scott, 1973; Carringer, 1974; Lambert, 1977). But the degree of proficiency that can be acquired in learning a language at school depends not only in the number of years during which it is learnt but also on the motivation of the student, the stage at which it is studied, the types of teachers and equipment provided and the methods of teaching adopted (Indian Education Commission 1964-66, p.192). A study in Great Britain (McEven, Gipps and Sumner, 1975) revealed that children's progress in learning English does not depend on their formal English teaching alone. There are other factors: (1) language spoken at home (2) pre-school experience/ English spoken at school and (3) social class. This study showed that Asian children who speak some English at home have a distinct advantage in terms of using the language over those who never or rarely do so (Ibid, p.110). Children who had received pre-school education were better at English than those who had not (Ibid, p.16). The deficiency of the bilinguals was due to the experimental groups lack of involvement in English life and culture (Ibid, p.14).

Learning through a foreign medium compels the students to concentrate on cramming instead of mastering the subject matter (Indian Education Commission 1964-66, p. 13). In the present study, students of English medium probably get little help from the home because of parents' illiteracy and the parents are not native speakers of English. Other reasons could be lack of English usage at school, switching from one medium to another[7], lack of teachers to teach in the English medium, incompetent teaching and a lack of confidence among the students.

Non-significant differences were found among the girls', boys' and co-educational school students on creativity (composite scores). Further analysis was carried out to see whether the achievement of girls studying in co-educational schools was better than that of students in unisex schools (boys or girls) and boys in co-educational schools. No significant differences were found. However, girls in co-educational schools

[7] Some students attend pre-school at Telugu medium schools; after some time they switch over to English medium schools. This is possible at school level or college level.

performed better than girls in single sex schools, but they did not achieve more than the boys (from boys' and co-educational schools). This may be due to the girls in co-educational schools having to deal with greater emerging problems and having less impositions on their roles (see 10.4.3).

A high percentage of students as a whole and in all three sub-groups (High, Average and Low creative groups) described their good experiences in the classroom as when they were given good marks or certificates/prizes. Students felt very bad when they were not able to get good marks in examinations (see table 10.22 & 10.23). This clearly indicates the academic pressure they are under. This includes highly creative children who were found to be 'addicted to school achievement'. They perceive academic failure as a bad experience in the class, and struggle for academic excellence, which is their main goal and interest in life.

These results contradict and question the study of Wallach and Kogan (1965). They observed, that especially low-creativity and high-intelligence children were found to be 'addicted' to school achievement. Academic failure was perceived by them as catastrophic, so that they continually strove for academic excellence in order to avoid the possibility of pain. This was their main goal and interest in life" (p.303).

This study suggests that whether the children's creativity is high or low, academic pressure is great where the teaching-learning process is a traditional one. Particularly, in India, teachers and parents always stress to children the importance of success in examinations. Their main aim is to secure the highest rank in examinations. Every child feels the pressure towards academic achievement rather than acquiring creative skills.

Studies of homework have shown that quality of work may be more important than quantity and that where the load is very great children may suffer from exhaustion & stress (Hallam & Cowan, 1998). Young children in particular must be free from the imposition of too much pressure of academic work, and should undertake some practically oriented activities rather than only theoretical lessons.

When we examined the students' bad experiences in classrooms as a whole (N=373), they were unhappy when classmates were not friendly or co-operative, did not like students' misbehaviour in the classroom, indiscipline, corporal and other punishment by the teachers for in-discipline, and teachers scolding for indiscipline. In addition, the high creative group had negative experiences when corporal and other punishment was given for not giving correct answers, teachers scolded for not doing homework and teachers were angry and insulting in the classroom. The creative

children also felt badly when teachers left the school, did not teach well, when there were no regular classes, when friends quarrelled and were separated, and friends were jealous.

Corporal punishment and an authoritarian atmosphere still prevail in schools in India (see table-10.23) which makes children fearful and may block their creative expression. Teachers should avoid corporal punishment, scolding and criticising. The teacher should provide a free, friendly and supportive learning environment in the classroom to avoid the passive participation of students. In this context, the observation of *Review committee of NPE'86 (1990)* is appropriate to quote:

> In a social and educational set-up like ours where the relationship between the teacher and the taught is still largely authoritarian, the general tendency is to suppress any urges and interests that deviate from the class norm. The first requirement for the promotion of talent, therefore, is for the teacher to create an atmosphere of free expression in the classroom and to provide opportunities for creative work (p.241).

As Torrance and Myers (1974, p.108) emphasise, the relationship of the teacher, to the pupil is extremely important. In a creative teacher-pupil relationship, the teacher must be willing to permit one thing to lead to another, and should not be disturbed when a pupil asks an unexpected question or proposes a surprising solution. The relationship is dominated by love and kindly concern. Discipline may be strict but not punitive or cruel. The pupil must feel that the teacher is "on his side", otherwise things can go badly awry (p.108).

In creating favourable conditions for learning and thinking, care should be exercised to see that pupils are reasonably comfortable, both physically and psychologically (Ibid, p.108). Rogers argues that permissiveness gives the individual complete freedom to think, to feel, to be, whatever is most inward within himself. It fosters openness, and the playful and spontaneous juggling of precepts, concepts and meanings, which is a part of creativity (Rogers, 1959, p.80). A teacher adapts classroom procedures to the students' interests and ideas wherever possible. This also means allowing time for students to think about developing their creative ideas in a climate of mutual respect and acceptance. This means a delicate balance between psychological safety and freedom, so that pupils are prepared to take risks (George, 1992, p.29-30).

Students should be given opportunities and it should be made clear that whatever ideas they give will be accepted in a very supportive way and whatever the opinion they have, it should be expressed freely. They should also be provided with an atmosphere where they can feel comfortable. They must also think that answers to

questions will not be ridiculed and may sometimes be kept confidential. At the same time they need encouragement to go beyond the syllabus and think about other areas.

Teachers need to understand learners' needs, should behave positively and supportively, open up new avenues and exploit every opportunity for learning. As George (1992) argues, the teacher is the facilitator, the resource manager, the enthusiast, the guide, the prompter, and the agent of change. The teacher can provide a warm, supportive atmosphere and allow children to make choices and to be a part of decision making process (p.30). Teachers increasingly recognise the need to adopt more creative strategies towards the management of the curriculum and to consider contexts which provide a more creative framework for teaching and learning. They are often keen to encourage children to be more creative and to develop strategies they can use to support and extend children's natural creative energies (Beetlestone, 1998, p.6). As Powell Jones (1972) argues the teacher must help pupils to discover their strengths and give them opportunities to experiment and to try out various ways of developing their abilities (p.28). Teachers should encourage the students to engage with tasks and give them scope for exploration. Open-ended tasks must be provided to the students and their creative efforts should be encouraged and rewarded.

Challenging activities could be organised on an individual basis or through group work. These can be planned or unplanned activities. Groups may be formed on the basis of abilities, shared interests and curiosity of the individuals. By assigning activities a teacher can build self-confidence among the students by supervising and helping in completing activities. The teacher can give incentives or reinforce the creative effort of the child in freely expressing his views. Students not only get the satisfaction of participation but motivate themselves and come forward to attempt other unassigned activities in their future life.

As Beetlestone (1998) explains, creativity as a form of learning can help to explain and interpret abstract concepts by involving skills such as curiosity, inventiveness, exploration, wonder and enthusiasm, which are all qualities young children have in abundance. These aspects can be harnessed by giving children greater technical mastery and wider vision so that creativity can inform all other learning (p.2).

The aims of the Swedish school curriculum, as mentioned by Bjerstedt (1976, p.3), suggest that "students should be encouraged and trained to make their own combinations, to draw their own conclusions, to design and create, to experiment and make discoveries. Problem sensitivity, ability in innovative thinking and independent creation are important characteristics". As Freeman (1985, p.17) has argued, problem

solving skills should be built in to teaching in many subject areas, so that the pupils are obliged to think for themselves. The skills of communicating what they have found are as important as the discoveries themselves, and should be taught and practiced in schools.

"Creative teaching can be seen as the same as good practice, yet good practice is not necessarily creative teaching. Creative teaching involves a complex interplay between the child, the teacher and the context in such a way that each element is pushing forward, seeking new boundaries, striving towards new territories, always looking to extend in the search for something new" (Beetlestone, 1998). Probably no subject or course is without its opportunities to teach creatively; and all learning will be more exciting, thrilling and meaningful with imaginative teaching. In this system self-initiated activity on the part of the learner is encouraged, and unique as well as conforming achievements are rewarded. Effective learning is characterised by personal expression, personal experience and personal discovery, and the educator accepts what the learner produces while trying to enlarge his background and enhancing his skills (Powell Jones, 1972, pp.106-107).

Science and mathematics can foster sustainable human development. They are also among the most appropriate subjects through which creative ability can be developed effectively. "Science and Technology have made many seemingly impossible things possible (Review Committee of NPE'86, 1990, p.22). An effective programme of Social Studies is also essential for the development of good citizenship and emotional integration (p.636).

The majority of the teachers perceive that the teaching of arts and music may be used for developing creative thinking, but creativity can be developed through all the school subjects, particularly science, mathematics and social studies. The highly creative students were shown to enjoy science and mathematics (table-10.19). These HC group children realised the importance of the subjects and were concerned with the quality of teaching and classroom atmosphere. They were also interested in science because it involving experiments and discoveries, is concerned with living beings, includes history of scientists and inventions, helps in understanding understand the natural environment and opens the door to new knowledge. Similarly, mathematics gives solutions to problems. This can give enjoyment, create interest and enthusiasm, and is full of fun and full of formulas and symbols (see Appendix E2, table E2-T2).

Unfortunately, the majority of the students (except the highly creative children) disliked science, mathematics and social studies (see table 10.20). Educators in India

need to consider how they might change these attitudes. The most common reason given for liking lessons was that they were taught interestingly by the teachers. Disliking a subject depended on the 'degree of understanding of the subject' and 'lack of interest in the subject'.

To inculcate interest among the students, teachers need to evolve imaginative methods. "Methods of teaching mathematics and science should be modernised, stressing the *investigatory* approach and the understanding of basic principles. Guide materials should be made available to help teachers adopt this approach. Laboratory work will be considerably important. There should be flexibility in the curriculum in order to cater to the special needs of the gifted" (Report of the Indian Education Commission 1964-66 p.636). Acquiring knowledge by itself does not lead to creativity.

12.2.4 Students' perceptions of their teachers' classroom behaviour as measured by TES

The overall scores on the Teacher Encouragement Scale (TES) showed no significant difference between girls and boys. But in the sub-scale analysis of TES, it was found that the girls were happier than the boys with the teachers' classroom organisation and teacher-pupil relations.

No significant differences were exhibited on the overall TES scores ($p>0.05$) between the Telugu and English medium students' assessment of their teachers encouragement. However, significant differences were found on teacher initiation ($p<0.01$), teacher attention ($P<0.01$), and strict control ($p<0.01$). English medium students were positive about teacher initiation, but unhappy with the level of teacher attention and the teachers' strict control over the students.

Wodtke (1974 & 1975) concluded that pupils of highly controlling teachers exhibit less self-initiated verbal behaviour, and achieve lower gains on measures of verbal creativity than those of more permissive teachers. In the present study, the English medium students felt that their teachers were very strict. This could be the cause for under-achievement of English medium students compared with Telugu medium students. Providing a friendly environment, making a stand for mutual understanding and respecting the dignity and worth of the individual can promote creativity (Torrance, 1962a).

A significant difference was found between girls', boys' and co-educational school pupils in assessing their teachers on TES scale ($p<0.05$). Students from boys' schools were more favourable towards the teacher encouragement than the other two categories of school students. There exist a notable significant differences among the

three type of schools students in the sub-scales teacher initiation ($p<0.0001$) and teacher attention ($p<0.001$) were found. The differences were also found in other sub-scales 'creating interest' and 'strict control' but they were statistically significant only at 0.05 level.

The result reveals that the three groups, high, average, and low creative groups were significantly differed ($p < 0.001$) on TES. It indicates that the highly creative students had more favourable attitudes towards teacher encouragement as perceived by students than their counterparts of average and low creative groups. It indicates that level of students' creativity proportionate to the teacher encouragement. The correlation analysis ($r=. 22$, $p< 0.001$) was shown a positive correlation between teacher encouragement (as measured by TES) and their students creativity. In the multiple regression analysis, teacher encouragement (TES) was found to be largely influencing the students creative thinking (see the exploratory correlate model). This result reflect the arguments of Torrance and Myers (1974, p.83), Powell Jones (1972, p.24), Passi (1989, pp.8-9) and Poole (1979, p.12) that teachers' efforts in encouraging children to use their creative abilities, receptive and accepting attitude of the teachers play an important role in fostering creativity in children.

12.2.5 .School activities

The majority of schools (about 80%) provided opportunities for pupils to participate in extra-curricular activities, but there was wide variation in the specific provision made.

Powell Jones (1972) emphasised that "it is important that children should be provided with sufficient variety of materials and experiences to give them a wide choice of activities for their leisure time. Increased attention must be attached to direct instruction in drama, film, the art and crafts and sports as an essential part of everyday learning"(p.108).

In India, it is not possible to provide all facilities in every classroom because of financial constraints. However, the school can at least provide a common Resource Room[8] for all the students in the school. This would be less expensive than providing facilities to all the classes in the school. The Resource Room might contain printed resources (books, magazines, newspapers, charts, maps and so on.,), special facilities (TV, video, slides, films, etc.,), special collections (animate and inanimate), information and retrieval systems (files, databases, personal computers etc.,).

laboratory equipment going beyond everyday needs (microscopes, telescopes, ovens etc.,) and a whole range of materials to allow experience with topics of special interest. Such a room would have the function of a library, with elements of laboratory, workshop and studio.

SUPW[9] and other activities like knitting, embroidery work, displaying artwork of the students could also be arranged in the room. Some lessons might be taught in the room, allowing exploration of new ways of learning. The resource room should be supervised by a resource teacher who has or should have skills in educational diagnosis, prescription and prescriptive teaching (McLeod and Cropley, 1989, pp.207-08). The resource teacher would co-operate and jointly plan with the student's regular subject teachers. The room would be regularly opened during school hours, and after school (a couple of hours) to enable the students to visit the room. The children could also visit during the lunch break, and in leisure time, and those not participating in games may also visit the room instead of wandering in the school grounds or on the Verandah.

Computer education, of course, is important because computerisation has become part and parcel of technologies contributing to development in every sphere (Review Committee of NPE'86, 1990, p.286). Computer applications have an important role in maintaining interest, developing curiosity and fostering the desire to master problem situations (McLeod and Cropley, 1989). They also provide various possibilities for group learning, and self and peer evaluation. Computer networks, or teamwork at the terminal, open up prospects for communication, joint planning, mutual help and moral support.

None of the schools had a computer (see table-11.12). Training of teachers in the use of computers has been inadequate, and computer learning is not reflected in the timetables of the students. Computer learning should be made an integral part of the timetable. It is linked to SUPW for which generally two periods in a week are provided in the school system (Review Committee NPE'86, 1990, pp.286-287). Computers could be provided in the resource room and used as a 'teaching aid'.

A high percentage of schools said that their students participated in school stage decorations, classroom decorations, decoration of school buildings and surroundings and preparation of wall posters on special occasions and displays (only 44%).

Schools could take the opportunity to extend this, to make school a world in miniature, a place where discovery exploration and enquiry can take place. School

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[8] See McLeod and Cropley, 1989, p 207-8.
[9] Socially Useful Productive Work (SUPW)

grounds should be planned with the same attention to detail as the school buildings (Titman, 1994). The school should offer lots of opportunities for involving the children in decorating school building and gardens. This develops a sense of responsibility for the maintenance, care and protection of that which has been created. Attitude and behavioural changes can also take place among the children because of greater involvement and participation. The teachers should made very clear to the children the importance of being involved, of doing things themselves; this in itself may make them "proud" of the outcome, almost regardless of how good it is (Titman, 1994).

Children's physical and emotional development can be nurtured alongside their creative growth by making full use of natural resources. For teachers 'nature' provides ample, free resources which can be used to enhance learning across the curriculum. It provides opportunities for developing creative skills, such as close observation. The outside area of a school - sharing the complex interrelatedness of nature itself – can provide a rich source for cross-curricular projects, meeting not only curriculum targets but also enhancing the quality of life for learners - and teachers. The learning context can be enhanced by landscaping grounds and making use of surrounding natural facilities (Titman, 1994, p.140-141).

The majority of the schools arranged visits to historical monuments (78%), museums (78%), and educational tours/ excursions (67%). But they failed to arrange visit to art galleries (100%); workplaces of craftsman (89%), workplaces of technicians (89%), and workplaces of local artists (67%); art exhibitions (56%) and field trips (67%).

Perry (1992) has argued that a successful museum experience that leads to learning includes six factors: 1). curiosity- the visitor is surprised and intrigued; 2). confidence- the visitor has a sense of competence; 3). challenge- the visitor perceives that there is something to work towards; 4). control- the visitor has a sense of self-determination and control. 5). play-the visitor experiences sensory enjoyment and playfulness; 6). communication- the visitor engages in meaningful social interaction (p.9). "Visitors do learn in the museum. Museum experience is tremendous; powerful, enriching, even life-changing moments are possible in museums (Hein, 1998, p.179). As Bryant (1961, p 11) said, 'Many curators underline the main purpose of the visit-that it should be enjoyable both as a social occasions and as part of interesting work, that the children should know that the exhibits are evidence for something, and that they must both select and interpret what they see'.

Children's efforts cam be directed in the museum and provide a basis for follow-up work in school. Worksheets provoke questions and discussion and so provide a far more valuable vehicle for imparting knowledge than the formal lecture given in a classroom atmosphere with children sitting in rows. (UNESCO, 1973, p.27)

Simply organising field trips or visiting other places is also not enough; the opportunity should be given to the students to discuss and interpret the information collected during the field trips. In studying the community and having contact with it, students feel that they are involved and playing a role in solving community problems. The community will feel that is not a separate institution but a functional part of its own organisation, contributor to its physical and moral growth (Khan, 1980, p.18). The community, if involved in the planning, will also help in raising funds and recruiting participants. Efforts have to be put into mobilising funds from different sources.

It is appropriate to quote some of the observations made by the Review committee of NPE'86 (1990) that:

> " the majority of our schools, whether urban or rural, Government or Private, the average school remains divorced from the community. There are already many rules and conditions for recognition and affiliation of a school. The committee suggested that one of the essential conditions be the school would engage itself in meaningful and on-going development work with the community. The linkage (or bond) of school with the community will manifest itself in collaborating with the community for provision or support of various kind of services. This kind of open-ended community and bridge building, breaking the traditional barriers, based on gender, group, caste, religion or language is seen as an important role of education" (pp.24-25).

Like many other studies, the present study indicates that there is a need for involvement of parents fully in the process of educating the children. Bastiani and Wolfendale (1996) emphasise the role of parents and teachers' mutual understandings. Teachers can share their learning objectives with parents and those willing to work on creative tasks such as modelling or cooking, bringing in artefacts, talking about their experiences or helping with tasks like costume design or productions. For this "contact between parents and teachers needs to be a ***two-way process***, from home to school and from school to home. Inadequate communication between the two may considerably hinder the scholastic progress of the child. This is especially true when considering creative work" (Powell Jones, 1992, p.32). Powell further suggests that the teacher must act as interpreter of the child's work to his parents, who can mistakenly stifle creative growth through imposing adult standards and ideas on him and attempting to correct anything which does not conform to a conventional standard. This contact must be maintained in Parent-Teacher Associations (PTA), open days, school visits, home visits, planned home-school conferences and study groups.

Parents should be invited to school often, to discuss or share their ideas in relation to the progress of their children and school (which is very common in British schools). The school should organise Social Evenings at regular intervals, perhaps two or three times a year depending upon the response from the parents. Frequent visits to school will develop a good rapport and concern about the school. This may also develop positive attitudes towards the school rather than parents misunderstanding[10] the school.

Particularly in India, the parents of students attending government schools are busy during the daytime with their routine work. So contacts with school are negligible. Teachers and parents do not know each other and there is a wide gap in communication between them. As the above Committee (Ibid, p.24) commented, *"the teachers, by and large, see themselves as responsible for teaching certain assigned subjects and doing certain other assigned tasks. They have little or no links with the concerns and situations of the community in which the school is placed and for the people, whose children they teach. This 'alienation' has to be put to an end. We see the imperative need for every school to be, in the real sense, a 'Community School'.*

A Community School would mean that the school is not only teaching the children from the community or area that it serves but is organically linked with the community, has emotional attachment with it, and hence is actively involved with and extends itself into the life and concerns of the community.

12.3.0 Recommendations

As a result of this study, designed to investigate the promotion of creativity among secondary school children in India and from the literature survey the following recommendations are made.

1. Provision should be made for further training or in-service training about creativity for the teachers teaching at various levels, i.e., primary, secondary and college, to enable them to acquire the necessary skills to promote creativity, to develop knowledge of new trends in thinking about creativity and motivating students to be creative. Specialised courses concentrating on one subject/area and refresher courses which introduce teachers to new curricula and techniques should be organised frequently. Teachers may then become well informed and familiar with the latest developments in education, information and communication technology through the mode of distance and continuing education.

[10] Misunderstanding, lack of understanding between parents and the school. Parents think that "the teachers are paid employees, they are not doing a proper job, students are not taught well". In their terms school is an isolated socialising agency. Teachers think, "Parents never care about their children's studies and shown little concern for School. Hence, the school is isolated day by day from society.

2. Teachers should be given freedom to experiment with new creative techniques in the classroom. Their creative work should be recognised and rewarded. Teachers can use the discovery method or problem-solving method, provided class size is restricted. The shift system of school should be abolished to enable teachers and students to work before and after the school hours. If necessary, time spent at school could be increased.
3. A good teacher - pupil relationship needs to be established in schools. Teachers need to create a friendly and affectionate environment in the class. They need to avoid the terrorising the students by the use of corporal punishment and try to keep a healthy rapport with pupils. The prejudice, bias and intolerant nature of teachers can spoil the entire situation in schools.
4. Provision may be also made for students' presentations in class and enabling them to write imaginative stories, poems, draw cartoons or pictures and build models by using various materials. Children should be provided with a sufficient variety of materials and experiences to give them a wide choice of activities for their leisure time.
5. Teachers can identify the children who have curiosity and interest in particular areas and can form subject clubs e.g. science clubs, mathematics clubs and cultural and literary clubs or committees. Teachers need to build-up confidence among students to take up projects or encourage the children to become involved in practical activities. This can be done after school hours.
6. Teachers and parents should make every effort to make their children independent and self-reliant in order to express their creativity. Children must be free from the imposition of too much pressure of academic work, and ample opportunities need to be provided for freedom of expression by respecting their thoughts and ideas, developing curiosity and encouraging experimentation.
7. Schools should maintain rapport with parents through PTA[11] and try to make occasions where the parents can become involved in the education process and let them share responsibility for their child's development. The parents should be fully informed about the importance of developing creativity and the role that they can play in promoting it, and helping their children in future careers selection.
8. Extra-curricular activities like drama, film, the art and crafts and sports are an essential part of everyday learning. Conducting debates[12], brainstorming[13] and synectics[14] are very important for developing creativity.

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[11] Parent- teachers Association

[12] The process of debate provides practice in organising, developing and presenting ideas in an orderly and efficient manner. Debate forces the students to look at the situation from all sides, to react quickly, defend and attack / respond to the issues before them.

9. The school should provide the infrastructure facilities, adequate instructional materials, a high quality of teaching, and provide an exciting and adventurous atmosphere for the children. School should also give proper guidance; encouraging children to undertake creative work by organising stimulating creative activities and exposing the children to the outer world by conducting educational tours and field trips.
10. The majority of the schools suffer from lack of funds. The government should assist these schools by providing greater funds. Schools can also conduct 'fund raising activities'[15] through the help of PTA. Schools can also generate funds through donations or by inviting, honouring or convincing industrialists in the area to contribute.
11. The study reveals that all most all schools have neither libraries nor laboratories. Where they exist they lack either materials or staff and are inoperative. In the fieldwork it was also observed that a negligible percentage of teachers have been appointed for art or craft and are assigned work most of the time which is other than what they are supposed to do. It is recommended that all libraries and laboratories should be merged into a 'resource room' and art and craft teachers and librarians may be trained as resource teachers if they have sufficient knowledge of science to arrange practicals. Resource teachers may also be newly appointed and these teachers will help in their respective fields in the resource room.
12. The curriculum should be flexible and according to the students' present day world needs. At secondary level, the syllabus must be reduced and a fixed portion should be allotted in order to improve creative thinking.

12.4.0 Limitations and suggestions for further research

1. Correlation does not indicate causality.
2. Lack of classroom observation to validate TES.
3. This research has some limitations. The first is that the sample of the teachers (88), though varied in terms of age, qualifications experiences, and taught subjects, is too small to allow one to make strong generalisations, based on the findings of the study, to the rest of the teachers in India.
4. The study was limited to surveying the government teachers' attitude towards the development of creative thinking at secondary level, particularly for IX class. Further

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[13] Brainstorming is a group activity: the members of the group are seated in a circle and encouraged to call out their ideas for given tasks, listing all the possible ideas and each member of the group ranks the importance of the listed ideas in order of preference. Finally they summarise the results.

[14] Synectics is a procedure for bringing together elements which do not seem to belong together. It seeks to systematise the process of seeing connections between elements of experience and knowledge, which are not normally regarded as belonging together.

[15] For example summer fairs, national and international evenings, by inviting artists various fields like games and sports, film industry or local artists.

research may be carried out with all the teachers working in all types of school e.g. private, residential, municipal and *Zilla Praja Parishads* [16].

5. In this investigation, an attempt was made to analyse the creative thinking abilities of IX class students studying in Government Telugu and English medium schools. This study was restricted to the urban schools of Hyderabad, capital city of Andhra Pradesh (India). Similar studies should be conducted on students belonging to Hindi and Urdu medium schools to know the effect of medium of instruction on creativity. The instruments used for measuring creativity in this study could be developed, instead of translating into the Telugu language if time and resources permit.
6. A checklist was supplied for the headteachers regarding the activities organised in the schools. Qualitative research could be undertaken to supplement the research exploring administrative and practical problems relates to promoting creativity in schools.
7. Qualitative research could also explore with parents of the students could have provided a comprehensive understanding of the home environment, child rearing practices, students activities at home, attitudes of the parents towards the school and children's progress.
8. A comparative study of central and state schools; rural and urban samples; ethnic and non-ethnic groups, various language groups, and different cultural background groups living in different parts of the India could also be carried out, with large samples to generalise the results.
9. A similar study might also be conducted with primary students and teachers, in order to understand the promotion of creativity at primary school level.
10. Examination papers of all subjects could be analysed at secondary levels i.e. VIII to X, to provide a complete picture of how examinations hamper creativity.
11. Ideas for curriculum reform expressed by the teachers could be explored.
12. Further research could attempt to determine the pattern of interrelationships between creative thinking, intelligence, academic ability and other variables (not included in the present study) to develop a more comprehensive model of creativity.

[16] Schools functioning under Local Bodies.

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Appendix-A1

A1.1 : Various Schemes and projects in Andhra Pradesh (INDIA).

The Department of Education (DOE, India) established the Operation Blackboard (OBB) scheme in 1986, this scheme provides grants to states to construct an additional classroom and post an additional teacher in single-teacher schools, requiring that half the teachers posted be women. It also provides grants to finance the purchase and distribution by the state of a pre-determined, standardised package of teaching materials and aids. (World Bank,1997)[1]

The DOE, India established a scheme of District Institutes of Education and Training (DIETs, 1988) by converting existing teacher Training Institutes (TTI's) or creating new ones in the rural districts. All the DIETS follow a standard organisational model, with departments for teacher education and training planning and management, research and evaluation, curriculum and materials development, educational technology and work experience education (World Bank,1997)

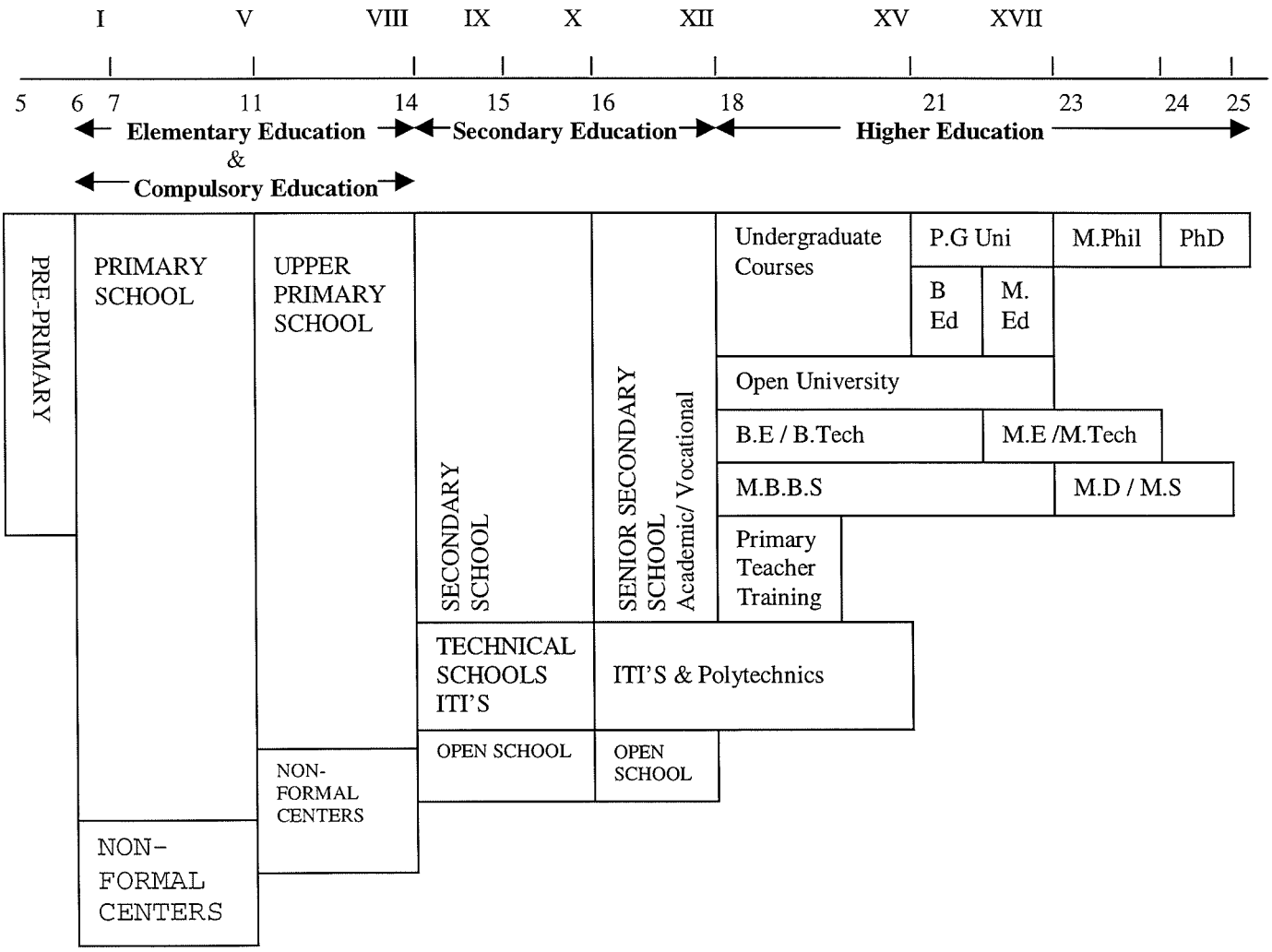
Andhra Pradesh Primary Education Project (APPEP)

This project is being implemented in Andhra Pradesh since April 1983 with the assistance of Overseas Development Administration (ODA) of U.K. The objective of the project is to improve the quality of primary education in the project area by (i) enhancing the professional competence of teachers and supervisors of primary schools through an HRD programme which emphasises child-centred learning and (ii) assisting construction of primary school buildings. The project covers all the primary schools in the state and envisages an outlay of Rs.31.2 million over the period 1990-92 (Government of India, Department of Education ,1993).

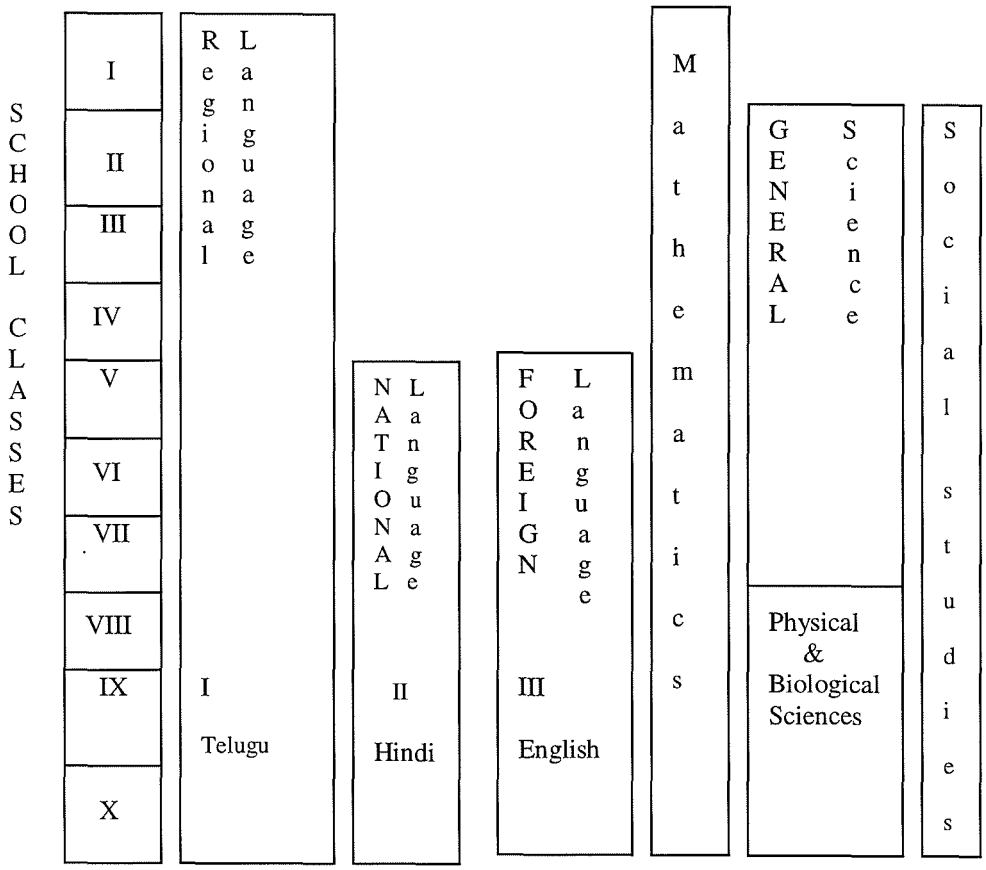
1 Source: World Bank (1977). Development in practice Primary Education in India. Washington a World Publication, 1997, p21.

Structure of Education in India

(Source: Development of Education in India 1990-1992)
(in Government of India, Dept. of Education (1993), p.5



Appendix – A_2
The study of subjects at school level
(Classes I – X)



School subjects and allocation of time in India

Classes VIII/IX-X	Time Allocation
1) Languages	8 hours
2) Mathematics	4 hours
3) Sciences (Theory & Practical)	5 hours
4) Social Studies	3 hours
5) One of the following The Arts(Music,Dancing,Painting etc.,), Home Science,Agriculture,Commerce, Economics, Social Reconstruction, Classical Languages etc.	2 hours
6) Socially Useful Productive Work and Community Service.	6 hours
7) Games, Physical Education and Supervised Study	4 hours
Total	32 hours

Appendix-A3

Table-A3-T1 : Andhra Pradesh at a glance (India Vs Andhra Pradesh).

Area, No. of Districts, No.of Inhibited villages and Density of population - 1991.

	Hyderabad**	Andhra Pradesh**	India*
1. Area (in Sq.KM)	217	275045	3287263
2. No. of Districts	-	23	503
3. No. of inhabited villages	-	26613	556310
4. Density (population)	14499	242	274
5. Population Male Female	3145939Σ 1627249Σ 1518690Σ	6.6508 (crores)Σ 3.3725 (crores) Σ 3.2783 (crores) Σ	84.6302 (crores) Σ 43.9230 (crores) Σ 40.7072 (crores) Σ
6. Literacy rate Male Female	71.52 78.90 63.56	44.09 55.13 32.72	52.21 64.13 39.29

- Annual report 1995-96: Ministry of Human Resource Development; Department of Education, Govt of India – 1996, pp. 239, 242.

** Selected Educational Statistics 1995-96; commissioner & Director of school Education, Andhra Pradesh, Hyderabad (As on 30-09-95).

Σ Population an according to 1991 census.

Table-A3-T2: Enrolment in schools- India Vs Andhra Pradesh (1995-96)

Country / State	Sex	Pre-primary	Primary	Upper primary	High school	Higher secondary	Total
India*	Boys Girls Total		62256958 46786705 109043663	24513275 15774565 40287840	15748656 8400752 24149408		101290751 70172014 171462765
Andhra Pradesh**	Boys Girls Total	506 495 1001	2934923 2548617 5483540	1113211 885594 1998805	1995768 1419056 3414824	51219 41275 92494	6095627 4895037 10990664
Hyderabad**	Boys Girls Total	- - -	35119 36688 71807	65261 61765 127026	198784 206143 404927	7994 8922 16916	307158 313518 620676

Sources

* Annual Report 1995-96, Govt. of India (1996).

** Selected Educational Statistics 1995-96: Commissioner & Director of school Education, Andhra Pradesh, Hyderabad (As on 30-09-95).

Table-A3-T3: Educational Institutions in India Vs Andhra Pradesh 1995-96.

Country/ State	Primary Schools	Middle Schools	High Schools	Higher Secondary	Colleges	Engineering & Medical	Universities
India *	590421	171216	71055	23588	6569	721	215
Andhra Pradesh**	49125	7298	7896	87			17
Hyderabad**	481	296	452	11			4

* Selected Educational Statistics Govt. of India, 1995-96.

** Selected Educational Statistics 1995-96: Commissioner & Director of school Education, Andhra Pradesh, Hyderabad (As on 30-09-95).

Table-A3-T4 : Teachers working in various school levels in India Vs Andhra Pradesh (1995-96).

Country/ State	Sex	Pre-Primary	Primary	Upper Primary	High School	Higher Secondary	Total
India*	Male Female Total		1189004 492966 1681970	736362 345983 1082345	906647 445651 1352298		2832013 1284600 4116613
Andhra Pradesh**	Male Female Total	3 22 25	74338 35102 109440	28882 18786 47668	65873 40753 106626	1579 2502 4081	170675 97165 267840
Hyderabad**	Male Female Total		392 1548 1940	869 3112 3981	2703 10003 12706	186 518 704	4150 15181 19331

* Selected Educational Statistics Govt. of India, 1995-96.
** Selected Educational Statistics 1995-96; commissioner & Director of school Education, Andhra Pradesh, Hyderabad (As on 30-09-95).

Table-A3-T5 :Type and management wise Teachers working in Andhra Pradesh (1995-96).

Type/ management	Pre-Primary		Primary		Upper Primary		High school		Higher Secondary (KV, NV)		Total
	NS	NT	NS	NT	NS	NT	NS	NT	NS	NT	NT
Central Govt.	-	-	25	99	5	77	27	572	51	2078	2826
State Govt.	1	2	3730	5810	346	2818	887	15031	-		23661
Local Bodies*		11	40461	82586	4543	21883	4619	45377	-		14857
Municipal	2	4	1397	4413	214	1709	223	3460	-		9586
PVT. Aided	4	7	2033	6989	477	4625	778	15070	-		26691
PVT. Unaided	1	1	1479	9543	1713	16556	1362	27116	24	2003	55219
Total	17	25	49125	109440	7298	47668	7896	106626	87+	4081	267840

Source: Selected Educational Statistics 1995-96; commissioner & Director of school Education, Andhra Pradesh, Hyderabad (As on 30-09-95).
NS = Number of Schools
NT = Number of Teachers
* = Local Bodies includes Mandal Praja Prishad(MPP) and Zilla Praja Parishad(ZPP) schools
\+ = 51+24=75 Affiliated to CBSE and 12 Affiliated to ICSE(Not mentioned in table).
KV = Kendriya Vidyalaya
NV = Navodaya Vidyalaya

Table-A3-T6: List of the schools for Pilot study in Hyderabad (AP) 1995-96

Name of the school	Zone	Type of the school	Medium of the school
1. Government High School, Moulali, Secunderabad.	3	Co-education	English & Telugu

Table-A3-T7 : List of the Government High Schools in Hyderabad (Andhra Pradesh)- 1995-96

Zone	Telugu Medium			English Medium			English & Telugu Medium			Other Languages			NM	Total		
	Co	Bo	Gr	Co	Bo	Gr	Co	Bo	Gr	Co	Bo	Gr		Co	Bo	Gr
1. Yakuthpura	3	-	-	2	-	-	-	-	-	U-6 TU-3	-	-	-	14	-	-
2. SeetharamBagh	2	4	-	-	-	1	-	-	-	U-1 HU-2 TU-1	U-4 TU-2 ETU-2 TM-1 H-1	U-2	1	6	14	3
3. Secunderabad	1	6	4	-	-	-	2	1^X	-	-	U-1	U-1	-	3	8	5
4. Sanathnagar	7	1	-	-	-	-	-	-	-	TU-1	-	-	1	8	1	-
5. Women's	-	-	1	-	-	4	-	-	-	-	-	U-3 TU-5 EU-1	1	-	-	14
6. Tilak Road	-	7	-	-	-	-	-	-	-	-	-	-	-	-	7	-
7. High schools attached to Jr. Colleges	-	3	-	-	1	-	-	2	1	-	TU-2	U-1 TU-1 EU-1	-	-	8	4
Total	13	21	5	2	1	5	2	3	1	14	13	15	3	31	38	26
														Grand Total = 98		

Source: District Educational Officer (DEO), Hyderabad District RcNo.SPL/STATISTICS/92 dated 07-11-1992.
NM= Not mentioned type of the school or Medium or Classes in the school
Co=Co-education Schools : Bo= Boys schools : Gr= Girls schools
U-1 One school Urdu medium: TU-1= One school Telugu/Urdu:
HU-2= two schools Hindi/Urdu: ETU-2= Two schools English/Telugu/Urdu: H-1= One school Hindi
X = This school did not have sufficient strength

Table-A3-T8: List of the schools for Final study in Hyderabad (AP) 1995-96

Name of the school	Zone	Type of the school	Medium of the school
1.GHS* , Lalapet, Secunderabad.	3	Co-education	Telugu
2. GHS, Seethaphalmandi, Secunderabad.	3	Co-education	English & Telugu
3. GHS, Rajbhavan, Secunderabad.	4	Co-education	Telugu
4. GHS, Punjagutta, Hyderabad.	4	Co-education	Telugu
5. GHS, Erramanzil Col., Hyderabad.	4	Co-education	Telugu
6. GHS, Aliya, Abids, Hyderabad.	Jr.Co	Boys	English
7. GHS, Mahaboobia, Gunfoundry, Hyderabad.	Jr.Co	Girls	English
8. GHS, Maredpally, Secunderabad.	Jr.Co	Girls	English & Telugu
9. GHS, Nampally, Hyderabad.	Jr.Co	Girls	English

GHS* = Government High School
Jr.Co = Attached to Government Junior Colleges

Appendix-B1

Confidential

Dr. BAQER MEHDI
M. A. (Columbia), Ph. D. (Aligarh)
Professor of Education
N. C. E. R. T., New Delhi-110016
T. M. No. 458715

TCW

Name— Age—

Class— School/~~College~~—

Father's/Guardian's name Occupation—

Home address— Date—

GENERAL INSTRUCTIONS

In this booklet you will find mentioned some interesting problems which will require the use of your thinking ability and imagination to solve them. The purpose is to see how quickly and imaginatively you can think under situations which require novel ways of dealing with them. Read each problem carefully and apply your best thinking in giving the responses. **Write your responses either in English or in your mother tongue,** Responses have to be given briefly but clearly in the space provided under each problem. Give a serial number to each of your responses. There are no right or wrong responses to any of these problem. Give a serial number to each of your responses. There are no right or wrong responses to any of these problems. Therefore use your imagination to think of as many responses as you can.

The problems are divided into *Four Activities*. Each Activity is separately timed. Within the time-limit for each Activity, you may work on the different problems according to your speed. When you finish one problem, go to the next. If necessary, you may return to the previous one again for any addition you would like to make. Remember that you have not to go the next Activity until the time for the first Activity is over and you are told to proceed further.

At the end you will be given *5 minutes extra* time, which you may use at any problem of any Activity in which you want to do additional work.

Please do not omit any problem.

Estd. : 1971 Phone : 63551

National
PSYCHOLOGICAL CORPORATION
4/230 KACHERI GHAT, AGRA - 282 004 (INDIA)

[2]

Activity : 1 What will happen, if.....

DIRECTIONS :

1. On this and the next page, you have been given some situations which will appear to you impossible. You have to think what would happen if such situations actually arise.
2. Give as many ideas as may come to your mind but try to think as many novel ideas as you possible can. Ideas which you think no one else might have thought of what would be the best. Write your responses in the space provided for.
3. You will be given to 15 MINUTES for this activity. After every five minutes you will be told the time so that you may move on to the next problem in the activity.

An example has been given which will help you to to know what you have to do.

EXAMPLE :

Question : What will happen if birds and animals start speaking like man ?

Responses : (i) This world will change into a different kind of society.
(ii) New leaders will emerge from amongst the animals.
(iii) It is possible that a donkey will become our leader.
(iv) It is also possible that he becomes our prime minister.
(v) Men may confide their secrets to their animal friends. etc.

PROMBLEMS :—

1. What will happen if man flies like birds ?

(3)

2. What will happen if your school is put on wheels ?

3. What will happen if man does not require any food to eat?

[4]

Activity : 2 NOVEL USES OF THINGS

DIRECTIONS

1. On this and the next page, you have been given names of certain things which could be used in many different ways. You have to think in how many different and new ways the things may be used.
2. Write as many uses as you can, but do try to think also those which are novel, that is, those which you think no one else might have thought of.
3. You will be given 12 MINUTES for this activity. After every four minutes you will be told the time so that you may move on to the next item in the activity.

Below is given an example which will help you to know what you have to do.

Example : News-paper.

Uses : (i) To read the news.
(ii) To make paper toys.
(iii) To get protection from the sun.
(iv) To wrap something.
(v) To cover a dirty place; etc.

PROBLEMS :—

1. Piece of stone

[5]

2. Wooden stick

3. Water

[6]

Activity : 3 SIMILARITIES

DIRECTIONS :

1. On this and the next page, you have been given pairs of world which can be related to each other in many different ways. You have to think in how many different and new ways are they related.
2. Write as many relationships as you can, but also try to think those which are novel, that is, those which you think no one else might have thought of.
3. You will be given 15 MINUTES for this activity. After every 5 minutes you will be told the time so that you may move on to the next problem in the activity.

Below is given an example which will help you to know what you have to do.

Example : Man and animal

Relationship : (i) Both have life.
(ii) Both need food and water.
(iii) Both can fall ill.
(iv) Both are afraid of enemy.
(v) Both have the experience of feeling cold and hot, etc.

PROBLEMS :—

1. Tree and House

7]

2. Chair and Ladder

3. Air and Water

[8]

Activity : 4 Making Things More Interesting and Useful

DIRECTIONS

Just keep in mind a simple model of a horse. You have to imagine in what ways you can change this simple model into an interesting and novel one for children to play with. You may think of adding any number of parts or accessories in order to make it really interesting and fascinating for children. Do not bother about the cost of the new parts or accessories that you would like to use in order make the toy model interesting and fascinating for children.

Write all the ideas which come to your mind in a serial order in the space given below.

You will be given 6 minutes for this activity.

SCORING SHEET TCW

ACTIVITY I

	Fluency	Flexibility	Originality
Item 1.			
Item 2.			
Item 3.			
Total			

ACTIVITY II

	Fluency	Flexibility	Originality
Item 1.			
Item 2.			
Item 3.			
Total			

ACTIVITY III

	Fluency	Flexibility	Originality
Item 1.			
Item 2.			
Item 3.			
Total			

ACTIVITY IV

	Fluency	Flexibility	Originality
Item 1.			

SCORE SUMMARY

	Fluency	Flexibility	Originality
Activity I			
Activity II			
Activity III			
Activity IV			
Grand Total			

● *See back page for further instructions regarding originality scorings.*

ORIGINALITY SCORING FOR RESPONSES NOT MENTIONED IN THE RESPONSE LIST

For any novel response not mentioned in the response list given in the manual, first of all briefly note it down in the space provided below giving the number of the activity and the item to which it belongs. Then, after you have scored all the test scripts, give it a score according to the scheme given in the manual and note the score in the appropriate column in the Scoring Sheet. In all probability, there will be very few such responses.

Activity	Item	Response	Originality Score

Appendix-B2

Dr. Baqer Mehdi
(Aligarh)

TCF
(English Version)

Name –		Class –
Date of Birth –	Age –	Sex –
Name of Institution –		
Father's Name –		Occupation –
City –	State –	Date –

INSTRUCTIONS

Creative thinking has played a very important role in man's life. People have achieved great things with the help of their thinking and imagination. In this booklet you will find some interesting figures which will require the use of your imagination in working with them. The purpose is to see how quickly and imaginatively you can work with these figures in order to make interesting pictures out of them. Take the given figure as the base and then draw a novel and interesting picture on that base. Apply your best thinking in drawing the pictures. Draw the picture from your imagination and give an appropriate title to it to explain what you have drawn. There are no right or wrong drawings. You are to use your imagination as much as you can to give us as elaborate and interesting a picture as possible.

The tasks in this booklet are divided into THREE ACTIVITIES. Each ACTIVITY is separately timed. Within the time limit for the activity you may work on the different drawings according to your speed. When you finish one drawing, go to the next in the same ACTIVITY. If necessary, you may return to the previous one again for any addition you want to make in your drawing. Remember that you have not to go to the next ACTIVITY until the time for the first ACTIVITY is over and you are told to proceed further.

At the end, you will be given 5 MINUTES EXTRA time which you may use to add new ideas to any drawing of any activity in which you want to do additional work.

Please do not omit any task. Start your work only when you are told to do so.

Estd : 1971 Phone : 364926
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4/230, Kacheri Ghat, AGRA – 282 004 (INDIA)

[2]

Activity 1 **PICTURE CONSTRUCTION**

Directions :–

On the following page you have been given two simple line drawings. Using them as a base or a part you have to draw pictures which you consider both novel and interesting. You can turn the page in any way you like to begin to draw your picture. Think of a picture which you feel no one else would be able to make. Try to add as many ideas as you can to make the picture interesting and novel.

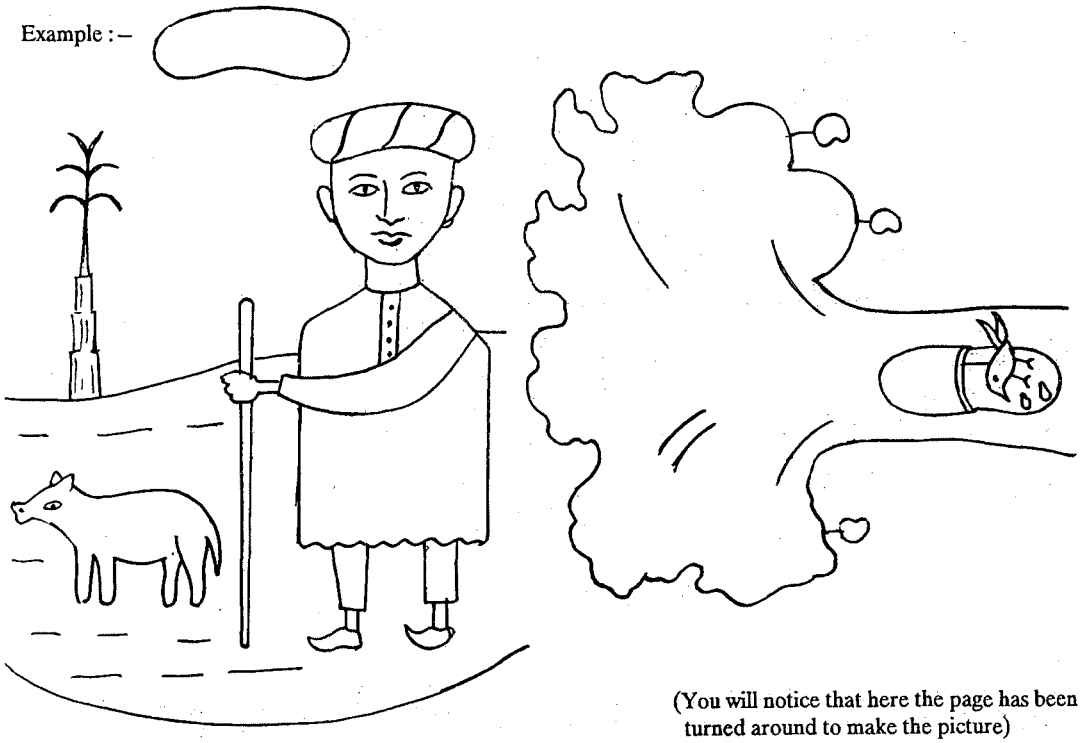
When you have completed the picture, give a title to it in the space provided for. Try to make the title as interesting and unusual as possible, which will show how imaginatively you can think.

You need not give much attention to accuracy and beauty of the picture. What is more important is that how novel and interesting is the picture you have drawn. Copying will not be of any help.

You will be given 10 minutes to complete this ACTIVITY. You will be told the time after 5 minutes so that you may move on to the next item in the ACTIVITY.

You will find that the figure given at your left has been used as a part in both the pictures. In the first picture, it has been used as a cap, and the other as hollow in the tree. You have to make only one picture with one part.

Example :–



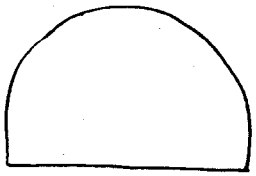
(You will notice that here the page has been turned around to make the picture)

Title : *A man gazing a pig.*

Title : *A bird's nest in the hollow of a tree.*

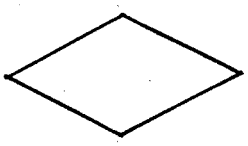
[3]

1.



Title :

2.



Title :

[4]

Activity II **PICTURE COMPLETION**

Directions :—

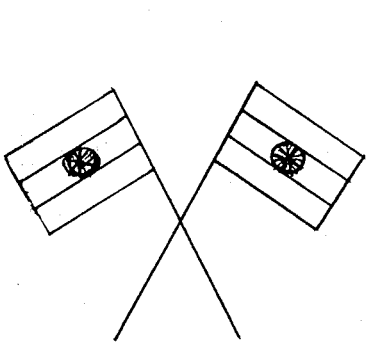
On the following pages you have been given 10 incomplete figures. Your task is to complete them in any way you like. Try to make the pictures as interesting and unusual as possible. Think of a picture which you feel no one else would be able to make.

Try to add as many ideas as you can to make the picture novel and interesting.

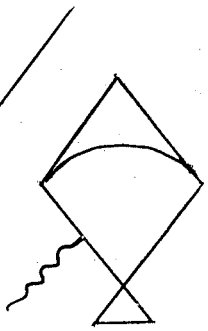
When you have completed your picture, give a title to it in the space provided for. Try to make the title as interesting and unusual as possible, which will show how imaginatively you can think.

You will be given 15 minutes to complete this ACTIVITY.

EXAMPLE :—



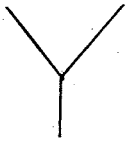
OR



OR

Title : *Flags of India's freedom struggle.* **Title :** *Kite flying in the air.* **Title :** *Leaves which look nice on the tree.*

1.



Title :

2.

Title :

5]

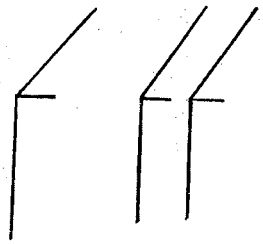
3.

Title :

4.

Title :

5.



Title :

6.

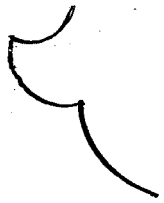
Title :

[6]

7.

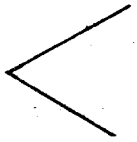
Title :

8.



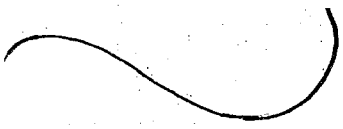
Title :

9.



Title :

10.



Title :

[7]

Activity III

Triangles and Ellipses

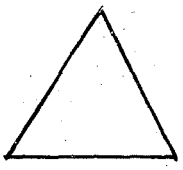
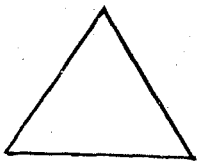
Directions :—

On the following pages you have been given two types of geometrical figures, namely a triangle and an ellipse. You can think of many objects or pictures which you can make with the help of these two figures using them as the main part.

You have to make each picture as interesting and unusual as possible. Each picture should be different from the other and must convey a complete idea. Try to think of objects which no one else might have thought of. After completing each picture give a title to it in the space provided. Try to make the title as interesting as possible which will show how imaginatively you can think.

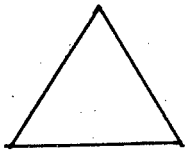
It is not necessary that you first finish all the triangles, and then go to the ellipses. When you find that no new ideas are coming to you on triangles, immediately move on to ellipses. Try to make as novel and interesting pictures as possible.

You will be given 10 minutes to complete this ACTIVITY.

1.	2.
	
Title :	**Title :**

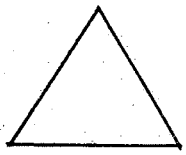
[8]

3.



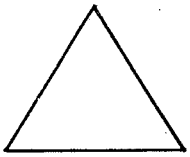
Title :

4.



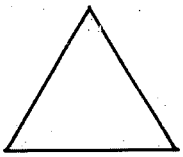
Title :

5.



Title :

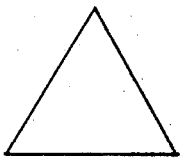
6.



Title :

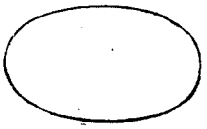
[9]

7.



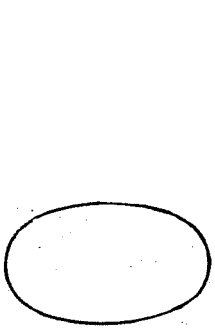
Title :

8.



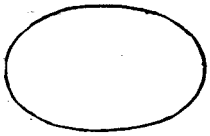
Title :

9.



Title :

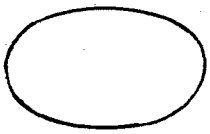
10.



Title :

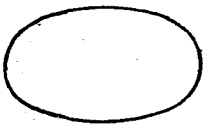
[10]

11.



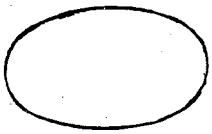
Title :

12.



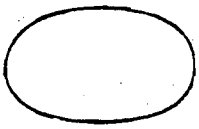
Title :

13 .



Title :

14.



Title :

SCORING SHEET

TCF

ACTIVITY I

	Elaboration (N)	Elaboration (V)	Originality (N)	Originality (V)
Item 1.	.....	.....	.....	.....
Item 2.	.....	.....	.....	.....
Total				

ACTIVITY II

	Elaboration (N)	Elaboration (V)	Originality (N)	Originality (V)
Item 1.	.....	.....	.....	.....
Item 2.	.....	.....	.....	.....
Item 3.	.....	.....	.....	.....
Item 4.	.....	.....	.....	.....
Item 5.	.....	.....	.....	.....
Item 6.	.....	.....	.....	.....
Item 7.	.....	.....	.....	.....
Item 8.	.....	.....	.....	.....
Item 9.	.....	.....	.....	.....
Item 10.	.....	.....	.....	.....
Total				

ACTIVITY III

	Elaboration (N)	Elaboration (V)	Originality (N)	Originality (V)
Triangles	.....	.....	.....	.....
Ellipses	.....	.....	.....	.....
Total				

SCORE SUMMARY

	Elaboration (N)	Elaboration (V)	Originality (N)	Originality (V)
Activity I	.....	.....	.....	.....
Activity II	.....	.....	.....	.....
Activity III	.....	.....	.....	.....
Grand Total				

• *See back page for further instructions regarding originality scoring.*

ORIGINALITY SCORING FOR RESPONSES NOT MENTIONED IN THE RESPONSE LIST

For any novel response not mentioned in the response list given in the manual, first of all briefly note it down in the space provided below giving the number of the activity and the item to which it belongs. Then, after you have scored all the test scripts, give it a score according to the scheme given in the manual and note the score in the appropriate column in the Scoring Sheet. In all probability, there will be very few such responses.

Activity	Item	Response	Originality Score

Appendix-B3

Students Information Scheduled (SIS)

1. My name .....

2. My school Name .....

3. My sex male □ female □

4. My age in years -----

5. My class IX Section- A/B/C/D/E

6. My mother tongue Telugu □ Hindi □ Urdu □ Others □

7. My religion : Hindu □ Muslim □ Christian □ Others □

8. My caste : OC □ BC □ SC □ ST □

9. Please indicate the highest educational level attained by your parents

Father	Mother	
□	□	**Post-Doctoral**
□	□	**Doctoral degree (PhD)**
□	□	**Master's Degree (MA/MSc/MCom/MBA)**
□	□	**Bachelor's Degree (BA/BSc/BCom/BBA)**
□	□	**Intermediate/HSC/PUC/Polytechnic Diploma/ITI**
□	□	**SSC/SSLC/ITI**
□	□	**Middle/Elementary**
□	□	**Primary**
□	□	**Literate**
□	□	**Illiterate**

10.(A) What is your father's occupation? ----------
(Write in the given blank- e.g. Doctor, Teacher...,)

(B) What is your mother's occupation? ----------
(Write in the given blank- e.g. Housewife, Nurse...,)

11. Please indicate monthly income of your parents

Father	Mother	Income Levels
☐	☐	No Earnings
☐	☐	Rs 1000 & below
☐	☐	Rs 1001 - 2000
☐	☐	Rs 2001 - 3000
☐	☐	Rs 3001 - 4000
☐	☐	Rs 4001 - 5000
☐	☐	Rs 5001 & above

12. My interests:

12.1. Write any three school subjects you like and give the reasons why you like them

1..... 2..... 3.....

12.2. Write any three school subjects you don't like and give the reasons why you dislike them

1..... 2..... 3.....

12.3. Write any three jobs you would like to do when you enter the job market and why you like them

1..... 2.....3.....

12.4. Briefly describe your good experiences in your classroom

12.5. Briefly describe your bad experiences in your classroom

Appendix-B4

Teachers Encouragement Scale

(Assessed by Students)

This scale is developed for research purposes only. It contains statements about practices which could take place in your classroom. You will be asked how often each practice actually takes place. Put a tick mark (√) in the box for an appropriate answer. Your responses will be confidential.

If you have any doubts about the questions don't hesitate to ask. Be sure to give an answer to all questions.

1. Does the teacher encourage you to think independently?
Always □ Usually □ Often □ Sometimes □ Never □

2. Does the teacher encourage you to ask any type of question in the classroom?
Always □ Usually □ Often □ Sometimes □ Never □

3. Does the teacher encourage students to take decisions when problems occur?
Always □ Usually □ Often □ Sometimes □ Never □

4. Does the teacher create imaginative situations in the classroom?
Always □ Usually □ Often □ Sometimes □ Never □

5. Does the teacher encourage you to gain information from a variety of sources?
Always □ Usually □ Often □ Sometimes □ Never □

6. Do you find that the teacher becomes anxious when any unexpected questions are asked?
Always □ Usually □ Often □ Sometimes □ Never □

7. Does the teacher ignore students when they raise questions?
Always □ Usually □ Often □ Sometimes □ Never □

8. Does the teacher praise students openly whenever new ideas are expressed?
Always □ Usually □ Often □ Sometimes □ Never □

9. Does the teacher criticise you for no good reason in the classroom?
Always □ Usually □ Often □ Sometimes □ Never □

10. Does the teacher have good relations with students?
Always □ Usually □ Often □ Sometimes □ Never □

11. Do you find that the teacher is friendly with students?
Always □ Usually □ Often □ Sometimes □ Never □

12. Do you find that the teacher is humorous with students?
Always □ Usually □ Often □ Sometimes □ Never □

13. Do you trust the teacher?
Always □ Usually □ Often □ Sometimes □ Never □

14. Is the teacher strict with students?
Always □ Usually □ Often □ Sometimes □ Never □

15. Does the teacher discourage you from following your own interests?
Always □ Usually □ Often □ Sometimes □ Never □

16. Does the teacher give examples from different fields that interest you?
Always □ Usually □ Often □ Sometimes □ Never □

17. Does every student get a chance to speak in class?
Always □ Usually □ Often □ Sometimes □ Never □

18. Does the teacher encourage you to discuss things in groups?
Always □ Usually □ Often □ Sometimes □ Never □

19. Does the teacher encourage you to participate in classroom activities?
Always □ Usually □ Often □ Sometimes □ Never □

20. Do students ask the teacher questions on their own?
Always □ Usually □ Often □ Sometimes □ Never □

21. Do the students find out the answers to questions from text books rather than from investigations?
Always □ Usually □ Often □ Sometimes □ Never □

22. Are the students' ideas/suggestions used during classroom discussions?
Always □ Usually □ Often □ Sometimes □ Never □

Notes: Underlined questions are deleted for final study

Appendix-B5

Schedule of questions for teachers
(The exploratory case studies)

Q1. Please give a brief description of creative thinking.

Prompt: What does it mean?

Q2. Please briefly outline what you think creative thinking is.

Q3. What is your level of knowledge about creative thinking and its development among the students?

Prompt: Comprehensive knowledge □ Good knowledge □
Some knowledge □ Only known by name □ Totally unknown □

Q4. Where did you acquire this knowledge?

Prompt: Sources of getting this knowledge eg. Training, books, ?

Q5. Do you have knowledge of any creative techniques in teaching?

Prompt: eg. Brainstorming or synectics

Q6. Have you applied any creative techniques in your classroom?

Prompt: (If yes) What type of techniques ?

Q7. Was developing students' creative thinking included in your teacher training?

Prompt: (If yes) in which subject was it included?

Q8. Have you attended any special training programmes or seminars in order to develop creative thinking in school students?

Prompt: (If yes) by whom was it organised?

Q9. **What support do you need in order to improve your knowledge and understanding of creative thinking ?**

Q10. How do you think that creative thinking is developed through teaching?

Q11. Do you think that all children can be taught to be creative thinkers ?

Prompt: (If yes) Could you Please explain how?

Q12. Do you think that Intelligence and creative thinking are different or aspects of the same?

Q13. Could you please explain how they are different?

Q14. Are all intelligent students creative?

Q15. Do you think that creativity is developed only in the teaching of the subjects Arts & Music ?

Q16. Are there any other school subjects which play a key role in developing creativity?

Q17. Have you Identified any creative children in your classroom?

Prompt: (If yes) On what basis (Criteria) do you identify them?

Q18. Do you think that the development of creative thinking among the school students is important?

Prompt: If Yes, why?
If No, Why not?

Q19. Would you like to encourage creative thinking among your students?

Prompt: If Yes, why would you like to?

If No, Why wouldn't you like to?

Q20. How can teachers can develop creative thinking among the students?

Q21. What barriers / Obstacles do you find in developing students' creative thinking?

Prompt: At different levels eg. School, Student, Teacher

Q22. What is your opinion about the role of the present examinations in developing creative thinking?

Q23. What is your opinion about the role of the present curriculum in developing creative thinking?

Q24. What suggestions would you recommend to develop creative thinking among the students?

Appendix-B6

Teachers Questionnaire on Creative thinking

Part-A :Teacher's Biography

1. Your Name .....

2. Sex Male ☐ Female ☐

3. Your age in years : 20-25 ☐ 26-30 ☐ 31-40 ☐ 41-45 ☐ 46-50 ☐ 51-55 ☐ 56-60 ☐

4. Your teaching experience in Years : 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21-25 ☐ 26-30 ☐ 31 and above ☐

5. Your educational qualifications

Academic	Year of Passing	Professional	Year of Passing
Undergraduate (Intermediate) ☐	------	Undergraduate (T T C/ UGD/Pandit) ☐	--------
Graduate (BA/ BCom /BSc) ☐	------	Graduate (BEd/BPEd/Pandit) ☐	--------
Postgraduate (MA/ Mcom /Msc) ☐	------	Postgraduate (M.Ed/MPEd) ☐	--------

If you have any other qualifications please specify .....

6. Type of school you are working in
   Government ☐ Private ☐ Govt-Aided ☐

7. Please state the level you are teaching at
   Primary ☐ Secondary ☐

8. Please state the subjects you are actually teaching

1.Telugu	☐	6. Physical Sciences	☐
2.Hindi	☐	7. Social Studies	☐
3.English	☐	8. Art	☐
4.Mathematics	☐	9. Music	☐
5.Bio-Science	☐	10. Physical Education	☐

11.Any other subject(please specify)_____

PART-B:Sources of knowledge about creative thinking

1. Was developing students' creative thinking included in your teacher training? YES/NO

2. If YES in which sujects it was included?

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3. If it was not included in your teacher training programe then where have you acquired knowledge about the development of creative thinking?

1. Special training programmes ☐
2. Refresher courses ☐
3. Seminars/ Conferences ☐
4. Colleagues and friends ☐
5. Teacher guides and supplementary materials ☐
6. Own interest in reading books and journals ☐
7. Other sources (please specify).....

4. Was creative thinking in school children emphasised in any training programmes/refresher courses you have attended ? Yes/No

If yes to Q.No.4

4.1 please state who organised the course

4.2 How was the content of the course relevant to your classroom teaching?

5. What type of support do you think you need to improve your knowledge of how to teach creative thinking?

6. What type of support do you think you need to improve your understanding of creative thinking?

PART-C : Defining creative thinking

1. Please consider the following list and rank them in order of importance 1 to 15 in relation to your view of creative thinking. Use number 1 to indicate your first choice.

Aspects	Rank
1. Aesthetic products	
2. Combining Ideas	
3. Divergent thinking	
4. Imagination	
5. Innovation	
6. Invention/Discovery	
7. Inspiration	
8. Intuition	
9. Original Ideas	
10. Self-expression	
11. Seeing connections	
12. Solving problems	
13. Thinking process	
14. Unconscious processes	
15. Valuable ideas	
Other (Please State)	

2. Do you think that creative thinking is promoted only by subjects like Art and Music. **Yes/No**

3. If NO , which other subjects in the high school curriculum do you think promote creativity among the students, and how?

4. Have you identified any creative children in your classroom? **Yes/No**

5. If yes, how do you identify them as creative children?

PART-D: Importance of creative thinking

1.How important do you think it is to develop creative thinking among school children?

Extremely Important □ **Very Important** □ **Moderately Important** □ **Not Very Important** □ **Not at all important** □

2. Please state the reasons for your response

3. Would you like to encourage your pupils to be creative? Yes/No

4. If yes, how would you encourage children to be creative in your classroom?

5. If no, why wouldn't you like to encourage creativity?

6. Here are some possible factors which may assist in developing creative thinking among students. How important do you think each of these is in developing creative thinking? For each statement place a tick (√) in the appropriate column.

Note: Please read E-Imp = Extremely Important
V-Imp = Very Important M-Imp = Moderately Important
NV-Imp = Not Very Important NA-Imp = Not At all Important

Statement	E-Imp	V-Imp	M-Imp	N-Imp	NA-Imp
1. Providing an exciting and adventurous school atmosphere					
2. Having good teacher-pupil relationships					
3. Building self-confidence among the students					
4. The pupils having a supportive home environment					
5. Encouraging pupils to ask questions					
6. Teachers asking open-ended questions					
7. Teachers asking provocative questions					
8. Treating students' questions with respect					
9. Treating students' imaginative ideas with respect					
10.Developing curiosity					
11.Encouraging experimentation					
12.Setting interesting tasks					
13.Teaching self-initiation to the students					
14.Teaching self-evaluation to the students					
15.Informal teaching					
16.A creative teacher					
17.Any other(Please specify)					

7. Below are listed some possible obstacles to students developing creative thinking at school level. Please read each statement then put one tick (√) to indicate the extent to which you agree that these factors prevent the development of creative thinking.

School Level	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1 Inadequate resources at school					
2 Unsuitable accommodation					
3 Over-large classes					
4 Inadequate funds					
5 Inadequate support from the headteacher					
6 Inadequate support from the parents					
7 Inadequate support from society					
8 Inadequate instructional materials					
9 Inadequate freedom for teachers to pursue creative activities					
10 Inadequate freedom for students to pursue creative activities					
11 Conflicting curriculum demands					
12 Any other(Please specify)					

8. Below are listed some possible student-level obstacles to the development of creative thinking. Please read each statement, then put one tick (√) to indicate the extent to which you agree that these factors prevent the development of creative thinking.

Student Level	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1 Students are not well motivated					
2 Students lack confidence					
3 Students have too much home-work					

Student Level	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
4 Students participate passively					
5 Students tend to rote learn					
6 Students perform poorly					
7 Students lack experience					
8 Any other (Please specify)					

9. Please find listed below some of the obstacles at Teacher level which may prevent the development of creative thinking in students. Please read each statement, then put one tick (√) to indicate the extent to which you agree that they may prevent the development of creative thinking.

Teacher Level	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1. Lack of knowledge about creativity among teachers					
2. Lack of understanding about creativity among teachers					
3. Teachers' over-emphasis on preparing students for examinations					
4. Teachers' stress on completing the syllabus					
5. Inadequate preparation time for teachers					
6. Lack of confidence among teachers					
7. Lack of experience among teachers					
8. Lack of recognition of teachers' creative work					
9. Lack of recognition of teachers work in promoting students' creativity					
10. Heavy teaching work-load					
11. Any other (Please specify)					

PART-E: Your opinion about encouragement of creative thinking

Please indicate the level of your agreement with each statement by placing tick mark(√).Please put only one tick for each question.

Note : Please read E-Imp = Extremely Important
V-Imp = Very Important M-Imp = Moderately Important
NV-Imp = Not Very Important NA-Imp = Not At all Important

Statement	E-Imp	V-Imp	M-Imp	N-Imp	NA-Imp
1. Students should be encouraged to be more sensitive to a wide range of environment stimuli					
2. Students should be encouraged to manipulate objects					
3. Students should be encouraged to try out various possible solutions to the problem					
4. Students should be permitted to judge/ evaluate themselves which is the best among the solutions to a problem					
5. Teachers should be tolerant when students present a variety of answer rather than single answer					
6. The teacher should expect and encourage unusual answers in the classroom					
7. Teachers should encourage students to exchange their ideas					
8. Teachers should be friendly with students					
9. Teachers should be authoritative rather than non-authoritative					
10.Teacher should reward students' imaginative efforts					
11. Teachers should respect students' thoughts and ideas					

Statement	E-Imp	V-Imp	M-Imp	N-Imp	NA-Imp
12. Teachers should encourage students to think independently					
13. Students should be exposed to a variety of types of situations					
14. Teachers own creativity helps in nurturing creative thinking					
15. Teachers should encourage students to further refine their ideas					
16. Students' ability to think creatively can be improved through direct instruction.					

PART-F: your opinion about the present curriculum

Do you agree or disagree with the following statements about the present curriculum? Please tick appropriate box.

Present curriculum at Secondary level	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1. Proper emphasis is not given in the curriculum to creative activities.					
2. The curriculum is not flexible enough to allow the student to pursue their creative activities					
3. The curriculum does not give enough scope for the students' self-evaluation and self-initiated learning					
4. The curriculum is overloaded in all or most of the subjects.					

Present curriculum at Secondary level	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
5. The curriculum is suitable and caters for the needs of a wide range of learners and their learning environment					
6. The methods of teaching are not appropriate to meet the needs of students to learn creatively.					

7. The curriculum emphasises:(please rank 1 to 5)

1. Knowledge □ **4. Application** □
2. Skills □ **5. Attitude** □
3. Understanding □ **6. Other** □
(Please specify--------)

8. The promotion of creative thinking is possible if the curriculum is (Please tick the appropriate box)

1. Child-centred □ **4. Teacher-centred** □

2. Teacher-centred but learner-based □ **5. Activity-centred** □

3. Examination-centred □ **6. Other** □
(Please specify--------

Appendix-B7

Observation Schedule of teacher's behaviour

Observation period: One period (45 minutes)

	Number of frequencies	
Types of reinforcement	**1 2 3 4 5 6 7 8 9 10 11 12**	**Total**
1.Attends to students' opinion		
2.Ignores students' ideas		
3.Accepts students' ideas eg. Yes or I see		
4.Encourages pupils to participate by using cues such as nodding of head, smiling and patting.		
5.Rewards pupils who give partially correct answers eg. Good attempt		
6.Builds on or asks questions of pupils who have contributed ideas		
7. Clarifies ideas of students'		
8.Elaborates on ideas of students		
9.Insists on correct responses		
10.Criticises positively		
11.Criticises negatively scolding, threatening		
12.Asks closed questions		
13 Asks open questions		

Appendix-B8

ACTIVITIES ORGANISED BY THE SCHOOL

(To be filled by headteacher)

Activities
1. Exhibitions of students' art work in the school. *Organised in the school* ☐ *Need to organise in the school* ☐
2.*Exhibition of other school students' art work or visit to other schools. *Organised in the school* ☐ *Need to organise in the school* ☐
3. Reproduction of the works of master artists by the students. *Organised in the school* ☐ *Need to organise in the school* ☐
4. Wall posters prepared on special occasions and displayed. *Organised in the school* ☐ *Need to organise in the school* ☐
5.*Masks and Puppets made from paper bags, paper mache (Paper strips pasting layer after layer /and paper pulp) and other materials. *Organised in the school* ☐ *Need to organise in the school* ☐
6. Students' participation in school stage and classroom decorations *Organised in the school* ☐ *Need to organise in the school* ☐
7.*Visits to historical monuments, art galleries, museums, art exhibitions and places of local artists, craftsman, technicians *Organised in the school* ☐ *Need to organise in the school* ☐
8. *Field trips/ tours/ excursions *Organised in the school* ☐ *Need to organise in the school* ☐
9.*Films, slides and reproduction of student's art works. *Organised in the school* ☐ *Need to organise in the school* ☐
10.*Cultural activities eg. drama, plays, mono-actions, fancy-dress, singing etc., *Organised in the school* ☐ *Need to organise in the school* ☐
11.*Drawing and painting activities *Organised in the school* ☐ *Need to organise in the school* ☐
12.*Constructions and designs with clay, plaster of Paris, wood etc., *Organised in the school* ☐ *Need to organise in the school* ☐
13.*Embroidery, knitting, etc., *Organised in the school* ☐ *Need to organise in the school* ☐

* Please strike out whichever is not applicable

ACTIVITIES ORGANISED BY THE SCHOOL

(To be filled by headteacher)

Activities
14.* Decoration of school buildings and surroundings e.g. new arrangements, landscaping of gardens, murals and or putting up art works etc., *Organised in the school* □ *Need to organise in the school* □
15.*Computer Games *Organised in the school* □ *Need to organise in the school* □
16.*Encouraging pupils to explore ideas through Science, Maths clubs and other subject clubs *Organised in the school* □ *Need to organise in the school* □
17*Special lectures/Programmes organised to inspire the students by eminent personalities in different fields eg. artists, musicians, scientists, writers. *Organised in the school* □ *Need to organise in the school* □
18.*Debate, Essay Competition, *Organised in the school* □ *Need to organise in the school* □
19.Seminars, Student presentations etc., *Organised in the school* □ *Need to organise in the school* □
20. Assist pupils in participating in the activities of their interest in and outside the school *Organised in the school* □ *Need to organise in the school* □
21. School magazines to encourage students' publications *Organised in the school* □ *Need to organise in the school* □
22.*Organisation of and participation in science fairs and exhibitions *Organised in the school* □ *Need to organise in the school* □
23.* Sports /Athletics / Games *Organised in the school* □ *Need to organise in the school* □
24.* NSS/ NCC/Scout *Organised in the school* □ *Need to organise in the school* □
25. SUPW/Occasional training *Organised in the school* □ *Need to organise in the school* □
26. School Days *Organised in the school* □ *Need to organise in the school* □

* Please strike out whichever is not applicable

If some of the items are not applicable or not feasible in your school, please strike out the items and give reasons why.

Appendix-B9

ACTIVITIES ORGANISED BY THE SCHOOL
(To be filled by headteacher)

	Statements	Organised in the school		Need to be organised in the school	
QNo	Activities organised	Yes	No	Yes	No
1	Encouraging pupils to explore ideas through (i) Science clubs (ii) Maths clubs (iii) Other subject clubs (if any)				
*2	Assist pupils in participating in the activities of their interest in and outside the school				
3	Organisation of (i)Science fairs (ii) Exhibitions				
	Participation in (i) Science fairs (ii) Exhibitions				
4	Special lectures / Programmes organised to inspire the students by eminent personalities in different fields e.g. Artists, Musicians, Scientists, Writers. etc., If **YES** please specify				
5	Organised / Encouraged (i) Seminars for students (ii) Student presentations in the school / class etc.,				
6	School magazines to encourage students' publications				
7	Exhibition / display of students' artwork in the school.				
*8	Exhibition / display of other school students' art work or visit to other schools				
9	(i) Reproduction of the works of master artists by the students. (ii) Reproduction of your school students art works by the other students				
10	Organised the shows for the students (i) Films (ii) Slides (iii) Video				
11	Drawing and painting activities				

* Please strike out whichever is not applicable

ACTIVITIES ORGANISED BY THE SCHOOL
(To be filled by headteacher)

	Statements	Organised in the school		Need to be organised in the school	
QNo	Activities organised	Yes	No	Yes	No
*12	Masks and Puppets made from paper bags, paper mache (Paper strips pasting layer after layer /and paper pulp) and other materials.				
*13	Constructions / designing models with clay, plaster of Paris, wood etc.,				
14	Embroidery, knitting, etc.,				
15	Computers Provided for the students (eg. Computer applications/ Internet / Computer Games)				
16	Laboratory facilities available for the students in the school (If **Yes** please mention the type of facilities provided)				
17	Library facilities provided for the students in the school (If **Yes** please mention the type of facilities provided)				
18	Visits to 1. Historical monuments 2. Art galleries 3. Museums 4. Art exhibitions 5. Places of local artists 6. Places of craftsman 7. Places of Technicians				
19	Organised 1. Field trips 2. Educational Tours / Excursions				

* Please strike out whichever is not applicable

ACTIVITIES ORGANISED BY THE SCHOOL
(To be filled by headteacher)

	Statements	Organised in the school		Need to be organised in the school	
QNo	Activities organised	Yes	No	Yes	No
20	(i) Debate				
	(ii) Essay competition				
21	(i) Sports				
	(ii) Athletics				
	(iii) Games				
22	(i) NSS				
	(ii) NCC				
	(iii) Scouts				
23	(i) SUPW				
	(ii) Vocational training				
24	Decoration of school buildings and surroundings (e.g. new arrangements, landscaping of gardens, murals and or putting up art works etc.,)				
25	Students' participation in				
	(i) School stage decorations				
	(ii) Classroom decorations				
26	Wall posters prepared on special occasions and displayed. (If yes please specify the occasions)				
27	Cultural activities				
	(i) Drama				
	(ii) Plays				
	(iii) Mono-actions				
	(iv) Fancy-dress				
	(v) Singing				
	(vi) Others (Please specify)				
28	School Day celebration				

* Please strike out whichever is not applicable

NOTE: If some of the items are not applicable or feasible in your school, please strike out the items and give reasons why.

Appendix-C1

Responses on the Verbal Creativity Test Items

Note: EG% = English medium girls (N=112) EB% = English medium boys (N=59)
TG% = Telugu medium girs (N=114) TB% = Telugu medium boys (N=88))
Tot % = Total (both media) (N=373) Ori. Wei.= Originality weight.

Activity - I : Consequences test

Activity - I (1) What will happen if man flies like birds ?						
Responses	EG %	EB %	TG %	TB %	TOT %	Ori. Wei.
A - Effect on Transport and Travel						
A1. Disuse of vehicles	28.6	50.8	42.1	27.3	35.9	-
A2. Disuse of Aeroplanes	14.3	32.2	24.6	18.2	21.2	-
A3. Disuse of Parachute	1.8	0.0	0.0	1.1	0.8	5
A4. Ease in travel	7.1	16.9	27.2	17.0	17.2	-
A5. Disuse of inventions	0.0	0.0	1.8	4.5	1.6	4
A6. Railway dept. may Be closed	3.6	10.2	5.3	3.4	5.1	-
A7. Transport Co. may not Progress	0.9	6.8	7.9	4.5	4.8	1
A8. Air travel Corp. may be closed	0.0	3.4	0.0	0.0	0.5	5
A9. Vehicle manufacturing company will go in loss	0.0	0.0	1.8	0.0	0.5	5
A10. River transport may be closed	0.0	1.7	0.0	1.1	0.5	5
B - Effect on communication						
B1. Disuse of telephone	0.0	0.0	1.1	0.0	0.5	5
B2. Disuse of Postal communication	6.3	0.0	1.1	2.3	2.9	3
B3. Disuse of telegraphy	0.0	1.7	0.0	0.0	0.3	5
C - Effect on Living Habits						
C1. No walking	1.8	1.7	3.5	2.3	2.4	3
C2. No use of stairs	1.8	0.0	0.0	0.0	0.5	5
C3. Living on trees possible	2.7	13.6	10.5	3.4	7.0	-
C4. Happy and joyful	8.9	5.1	8.8	3.4	7.0	-
C5. No need to work for food	6.3	0.0	15.8	6.8	8.3	-
C6. No need of clothes	1.8	0.0	0.9	2.3	1.3	4
C7. Legs will become weak	0.9	0.0	0.9	0.0	0.5	5
D - Thrill of New Experience						
D1. Moon travel made easy	1.8	1.7	19.3	12.5	9.7	-
D2. Travel to fairy land	2.7	1.7	8.8	6.8	5.4	-
D3. Travel to other Countries	0.9	8.5	5.3	5.7	4.6	1
D4. Travel to beautiful places will become easy	13.4	10.2	8.8	8.0	10.2	-
D5. Travel to other planets with in the reach every body	1.8	1.8	0.0	8.8	9.1	-
D6. Visiting to heaven possible	1.8	0.0	1.8	0.0	1.1	4
D7. To discover new places	0.0	0.0	0.9	2.3	0.8	5
E - Man-Bird Relation						
E1. Competition between species	0.0	0.0	0.0	1.1	0.3	5
E2. New friendships	0.9	3.4	1.8	1.1	1.6	4
E3. Hostility with birds	0.9	1.7	0.0	2.3	1.1	4
E4. New type of relations between man and birds will develop	8.9	1.7	5.3	4.5	5.6	-
E5. New types of game between man and birds possible	0.9	0.0	0.0	0.0	0.3	5
F- Self - Defence						
F1. Safety from dangerous animals	2.7	1.7	0.9	2.3	1.9	4
F2. Safety from floods	0.0	0.0	3.3	1.1	1.3	4
F3. No security of life	0.0	3.4	0.0	1.1	0.8	5
F4. Safety from earthquakes	0.0	3.4	0.0	0.0	0.5	5
G - Biological changes						
G1. Legs will become shorter	0.9	0.0	0.0	0.0	0.3	5
G2. Tail will be developed	0.0	1.7	0.0	0.0	0.3	5
G3. Wings will be developed	6.3	1.7	7.9	2.3	5.1	-
G4. Brain will become more alert	0.0	0.0	0.0	0.0	0.3	5
G5. Man will lay eggs like bird	2.7	1.7	0.0	0.0	1.1	4
G6. Weight and size will decrease	0.9	1.7	0.0	0.0	0.5	5
G7. New type of bodily changes	0.9	3.4	4.4	2.3	2.7	3

Activity - I (1) What will happen if man flies like birds ?						
Responses	EG %	EB %	TG %	TB %	TOT %	Origi. Weig.
H - Overcoming Hurdles						
H1. No need for bridge and roads	4.5	3.4	5.3	1.1	3.8	2
H2. Going to hill top easier	0.0	5.1	2.6	1.1	1.9	4
H3. Plucking of fruits from trees possible	2.7	3.4	8.8	4.5	5.1	-
H4. Hunting will become easy	1.8	10.2	0.0	5.7	3.5	2
H5. No farming	0.9	0.0	1.8	1.1	1.1	4
H6. No cooking	0.0	3.4	0.0	0.0	0.5	5
H7. Catch kites easily	0.0	1.7	0.0	0.0	0.3	5
H8. Crossing the ocean will become easier	0.0	0.0	0.0	1.1	0.3	5
I - Effect on sports, Games Recreation						
I1. New sky games will be developed	1.8	1.7	1.8	1.1	1.6	4
I2. Competition in flying	0.0	0.0	0.0	1.1	0.3	5
J - Observation facility						
J1. Can see from above	0.0	0.0	7.9	5.7	3.8	2
J2. Spotting lost persons easier	0.0	0.0	0.9	2.3	0.8	5
J3. Spotting the lost animals	0.9	0.0	0.0	1.1	0.5	5
J4. Spotting flood affected animals	0.0	0.0	0.0	1.1	0.3	5
J5. Watching the crops easier	5.4	3.4	8.8	2.3	5.4	-
J6. Watching the different persons on duty	0.0	0.0	4.4	0.0	1.3	4
J7. Watching the animals grazing	0.0	0.0	1.4	0.0	0.5	5
K - Effect on economy						
K1. Saving of money in travel	0.0	3.4	0.0	1.1	0.8	5
K2. Loss to automobile industry	0.0	0.0	0.0	1.1	0.3	5
K3. Save time in travel	1.8	5.1	1.8	1.1	2.1	3
K4. No money spend for food	0.9	0.0	0.9	0.0	0.5	5
K5. No own property	0.0	0.0	0.0	1.1	0.3	5
K6. No Financial organisations	1.8	0.0	0.0	0.0	0.5	5
K7. No business markets	1.8	0.0	3.5	1.1	1.9	4
K8. Loss to the Govt.travelling revenue	0.0	1.7	0.9	1.1	0.8	5
K9. No use of electricity	0.0	0.0	0.9	0.0	0.3	5
K10. New type of industries are making type of special soap to wash the wings	0.9	0.0	0.0	0.0	0.3	5
K11. New type of tourism without ticket	9.8	1.7	5.3	6.8	6.4	-
K12. Petrol will become cheaper	6.3	6.8	1.8	8.0	5.4	-
L - Legal and Administrative Implications						
L1. More thefts	0.0	1.7	0.0	2.3	0.8	5
L2. More illegal crossing into other's territory	3.6	5.1	0.0	0.0	1.9	4
M - Problems of traffic control						
M1. Need for new rules	0.9	1.7	0.9	0.0	0.8	5
M2. No traffic jams	2.7	3.4	3.5	4.5	3.5	2
M3. Crowding in air	3.6	8.5	2.6	9.1	5.4	-
M4. Possibilities of more accidents	0.0	1.7	0.9	1.1	0.8	5
M5. No need to traffic signals	0.0	0.0	3.5	0.0	1.1	4
M6. Possibility of less accidents on the ground	2.7	1.7	1.8	2.3	2.1	3
M7. Possibility of more accidents in the air	2.7	1.7	0.9	2.3	1.9	4
M8. Setting up of new department for traffic control	0.0	3.4	0.0	1.1	0.8	5
M9. New type of rules for air traffic control	0.0	3.4	0.0	1.1	0.8	5
M10. Pollution free world	0.0	0.0	11.4	9.1	5.6	-
N – Social and Political Consequences						
N1. New pattern of society will be evolved	33.9	8.5	14.0	13.6	19.0	-
N2. Less number suicides	0.0	0.0	0.0	1.1	0.3	5
N3. New types of Housing problems	1.8	1.7	5.3	4.5	3.5	2
N4. More importance to trees	1.8	5.1	0.9	0.0	1.6	4
N5. Least importance for house	7.1	3.4	15.8	8.0	9.4	-
N6. No permanent neighbours	0.0	1.7	0.0	0.0	0.3	5
N7. Need new type of prisons	0.0	1.7	0.0	0.0	0.3	5
N8. No difference between poor and rich	0.9	0.0	0.9	0.0	0.5	5
N9. No fundamental rights	0.9	0.0	0.0	0.0	0.3	5
N10. No difference between man and birds	7.1	5.1	16.7	9.1	10.2	-
N11. New type of elections with birds participation	5.4	0.0	1.8	0.0	2.1	3
N12. Leaders will emerge in birds	1.8	0.0	0.0	3.4	1.3	4

Activity - I (1) What will happen if man flies like birds ?						
Responses	EG %	EB %	TG %	TB %	TOT %	Origi. Weig.
O - Psychological Consequences						
O1. Tensions reduced	2.7	1.7	6.1	3.4	3.8	2
Q - Effect on the nature of war						
Q1. New type of wars in the air will be fought	2.7	0.0	1.8	1.1	1.6	4
Q2. New Defence Problems	0.0	1.7	0.0	0.0	0.3	5
R -Effect on atmosphere						
R1. The volume of air will change	4.5	0.0	0.0	1.1	1.6	4
R2. More air pollution due to overcrowding	0.9	0.0	0.9	0.0	0.5	5
R3. Population will less on earth	7.1	10.2	10.5	2.3	7.5	-
S - Sky						
S1. Man can flying in the sky	18.8	27.1	17.5	13.6	18.5	-
S2. Possibility of meetings in the sky	0.0	0.0	0.0	1.1	0.3	5
S3. New Schools emerge in the sky	1.8	1.7	0.0	2.3	1.3	4
U -Effect on education						
U1. No formal Schools	0.9	1.7	2.6	1.1	1.6	4
U2. No late to Schools and Offices	2.7	1.7	0.9	1.1	1.6	4
U3. New languages will emerge	3.6	0.0	1.8	0.0	1.6	4
ACTIVITY -I(2) What will happen if your school is put on wheels ?						
A - Educational Implications						
A1. Rural population benefited	0.0	0.0	3.5	2.3	1.6	4
A2. Increase in mobility	25.9	37.3	57.0	48.9	42.6	-
A3. Ease in study	2.7	0.0	0.0	0.0	0.8	5
A4. New concepts of education may develop	1.8	0.0	0.9	4.5	1.9	4
A5. More attraction for school coming	3.6	6.8	6.1	4.5	5.1	-
A6. Education through actual observation of environment.	16.1	11.9	4.4	5.7	9.4	-
A7. Increase in school fees	0.9	0.0	0.0	0.0	0.3	5
A8. Pupil afraid to come school	5.4	1.7	4.4	4.5	4.3	1
B - Problem of Location						
B1. No address	8.9	11.9	10.5	4.5	8.8	-
B2. Difficulty in searching school	8.9	23.7	15.8	9.1	13.4	-
B3. Wastage of time in collecting all children from different places	0.9	5.1	0.0	1.1	1.6	4
C - Traffic Problem						
C1. Traffic jams, etc.	3.6	10.2	2.6	1.1	3.8	2
C2. Accidents	0.9	8.5	1.8	0.0	2.1	3
C3. Broad roads will be required	1.8	3.4	0.0	1.1	1.3	4
C4. More accidents and deaths	0.0	0.0	0.9	1.1	0.5	5
C5. Hijacking School easy	0.0	0.0	1.8	3.4	1.3	4
D - Inconveniences and Hazards						
D1. Reading inconvenience	12.5	13.6	26.3	12.5	16.9	-
D2. Black board falling	0.0	0.0	0.9	2.3	0.8	5
D3. Electricity connections	5.4	0.0	0.9	1.1	2.1	3
D4. Water supply	2.7	0.0	0.0	0.0	0.8	5
D5. No plantation	0.9	0.0	0.9	0.0	0.5	5
D6. Writing inconvenience	0.9	0.0	0.9	0.0	0.5	5
D7. At the time strike it will be thrown into the Village pond	1.8	0.0	0.9	0.0	0.8	5
E - Psychological Effect						
E1. Lack of concentration	2.7	6.8	7.9	10.2	6.7	-
E2. Less boredom	0.0	0.0	0.0	1.1	0.3	5
E3. No food export and Import	0.0	0.0	0.0	1.1	0.3	5
F - Social consequences						
F1. Will bring people and places nearer	5.4	10.2	7.9	12.5	8.6	-
G - Economic Implications						
G1. Saving of money	0.9	1.7	0.0	0.0	0.5	5
G2. No school bus	5.4	15.3	10.5	5.7	8.6	-
G3. Distinguish problem between school and bus	0.0	6.8	0.0	1.1	1.3	4
G4. Income to repair shops	0.0	1.7	0.0	0.0	0.3	5
G5. Increase of vehicle industries	0.9	0.0	0.0	0.0	0.3	5
H - Special Advantages to Pupil						
H1. No late coming	1.8	1.7	0.0	0.0	0.8	5
H2. Ease in coming	0.0	0.0	0.0	2.3	0.5	5

ACTIVITY -I(2) What will happen if your school is put on wheels ?						
Responses	EG %	EB %	TG %	TB %	TOT %	Originality Weight
H3. No walking	0.0	0.0	3.5	2.3	1.6	4
H4. School would comes to the house	4.5	18.6	8.8	18.2	11.3	-
I - Effect on School Building						
I1. Cracking of walls	3.6	6.8	1.8	2.3	3.2	2
I2. Fall down	13.4	3.4	7.9	3.4	7.8	-
I3. New light building material will be developed	1.8	0.0	0.0	1.1	0.8	5
J - Amusement						
J1. Recreation	1.8	5.1	1.8	0.0	1.9	4
J2. Tours	5.4	3.4	4.4	4.5	4.6	1
J3. More picnics	3.6	0.0	0.0	1.1	1.3	4
J4. More sight seeing	8.0	1.7	2.6	5.7	4.8	1
K - Miscellaneous						
K1. Transport Corporations will go in loss	0.9	0.0	0.9	0.0	0.5	5
K2. More expenditure on the repairing of roads	0.0	0.0	0.9	0.0	0.3	5
K3. Parents will be worried about the safety their children	0.9	0.0	0.0	0.0	0.3	5
K4. Safety from floods	0.0	0.0	0.9	4.5	1.3	4
K5. Sports and games will not continue	0.9	3.4	0.0	1.1	1.1	4
ACTIVITY -I(3) What will happen if man does not require any food to eat ?						
A - Social Consequences						
A1. No begging	0.9	0.0	4.4	1.1	1.9	4
A2. No food problem	3.6	8.5	7.9	15.9	8.6	-
A3. Relief to poor	3.6	1.7	6.1	1.1	3.5	2
A4. No population problem	0.9	3.4	2.6	10.2	4.0	1
A5. No feeding problem	0.9	0.0	0.0	1.1	0.5	5
A6. No famines	0.0	0.0	2.6	3.4	1.6	4
A7. No robbing	2.7	0.0	4.4	3.4	2.9	3
A8. No deaths of sacks	1.8	1.7	0.9	1.1	1.3	4
A9. No bribing	0.0	0.0	0.0	1.1	0.3	5
A10. No rich and poor	0.9	1.7	3.5	3.4	2.4	3
A11. Less hostility among people	1.8	1.7	1.8	1.1	1.6	4
A12. No world wars	0.0	0.0	0.9	0.0	0.3	5
A13. No strikes in offices and industries	0.0	0.0	0.9	0.0	0.3	5
A14. Business of eatables will go off	1.8	6.8	7.0	1.1	4.0	1
A15. Fruits and vegetables will be spoiled	2.7	5.1	3.5	2.3	3.2	2
A16. Food markets will be closed	5.4	0.0	0.9	0.0	1.9	4
B- Effect on Man's Morals and Religion						
B1. No hoarding	0.0	0.0	4.4	0.0	1.3	4
B2. More honesty	0.0	0.0	2.6	9.1	2.9	3
B3. No jealousy	0.0	0.0	0.9	1.1	0.5	5
B4. No fasting	0.0	0.0	0.9	0.0	0.3	5
B5. More sincerity	0.0	1.7	0.0	0.0	0.3	5
B6. No hunting	0.0	0.0	3.5	5.7	2.4	3
B7. Animal kingdom will grow in abundance	0.0	1.7	0.0	2.3	0.8	5
C - Changes in Scientific Research						
C1. No agricultural research	0.9	0.0	7.9	3.4	3.5	2
C2. Chemical research will take new turn	0.0	0.0	1.8	0.0	0.5	5
C3. No doctor	0.0	0.0	0.9	0.0	0.3	5
D - Effect on Human Biology and Physique						
D1. Man will become machine	0.9	1.7	0.9	0.0	0.8	5
D2. Live by water alone	2.7	0.0	7.0	2.3	3.5	2
D3. No digestive system	0.9	1.7	6.1	4.5	3.5	2
D4. Lazy	9.8	10.2	10.5	11.4	10.5	-
D6. Helpful to handicapped	0.0	1.7	0.0	0.0	0.3	5
D7. Man depend on oxygen	0.9	3.4	1.8	1.1	1.6	4
D8. Human figure will change	1.8	1.7	0.9	2.3	1.6	4
D9. Size of stomach will change	0.9	0.0	0.0	1.1	0.5	5
D10. Human life without food is impossible	55.4	50.8	43.0	34.1	45.8	-
E - Effect on Economy and Occupation						
E1. No farming	21.4	22.0	36.8	22.7	26.5	-
E2. No hotel	0.9	1.7	0.0	2.3	1.1	4

ACTIVITY -I(3) What will happen if man does not require any food to eat ?						
Responses	EG %	EB %	TG %	TB %	TOT %	Originality Weight
E3. No unemployment	0.0	0.0	1.8	0.0	0.5	5
E4. No food export and import	0.0	0.0	0.9	0.0	0.3	5
E5. More cotton (Commercial crops)	0.0	0.0	0.9	0.0	0.3	5
E6. Save money	5.4	13.6	7.0	8.0	7.8	-
E7. More scientific discoveries	0.0	0.0	0.0	1.1	0.3	5
F - Effect on Sanitation						
F1. Disuse of lavatory	0.0	0.0	0.9	0.0	0.3	5
F2. Decrease in pollution	0.0	0.0	0.9	0.0	0.5	5
F3. Clean streets	0.9	0.0	0.0	0.0	0.3	5
G - Amusement & Recreation						
G1. Joy of life reduced	0.9	3.4	0.9	0.0	1.1	4
G2. Ease in long travel	0.0	1.7	0.9	2.3	1.1	4
G3. No need to do any job or work	35.7	39.0	35.1	27.3	34.0	-
H -Psychological Implications						
H1. Deprivation	0.0	0.0	0.9	0.0	0.3	5
H2. Lack of motivation	18.8	10.2	0.9	5.7	8.8	-
H3. Less worries	7.1	3.4	5.3	8.0	6.2	-
I - Miscellaneous Responses						
I1. More time to study	0.9	0.0	0.9	4.5	1.6	4
I2. Animal's position Improved	0.0	0.0	0.9	0.0	0.3	5
I3. Saving of time	0.0	1.7	0.9	1.1	0.8	5
I4. More progress	0.0	3.4	0.0	0.0	0.5	5
I5. No war	0.0	0.0	0.9	0.0	0.3	5
I6. Increase forests and plants	0.9	3.4	2.6	5.7	2.9	3
I7. More time to pray to god	0.0	1.7	1.8	0.0	0.8	5
I8. No lunch bell in School	0.9	0.0	0.0	0.0	0.3	5
I9. No afraid of floods	0.0	0.0	4.4	0.0	1.1	4
I10. No Govt. subsidies on food	0.9	3.4	5.3	2.3	2.9	3
I11. Diseases will decrease	2.7	1.7	1.8	1.1	1.9	4
I12. No cooking	2.7	0.0	0.9	1.1	1.3	4
I13. No pickle making	0.0	1.7	0.0	0.0	0.3	5
I14. Pattern of life will change	0.9	1.7	0.0	0.0	0.5	5
I15. Utensil factories will go	0.9	1.7	2.6	0.0	1.3	4
I16. No kitchen in the houses	0.9	0.0	0.0	0.0	0.3	5
J- Amusement						
J1. Tours	4.5	6.8	0.0	0.0	2.4	3
J2. More sight seeing	0.0	3.4	0.0	0.0	0.5	5
Activity-II Unusual uses : Problem:-1. Piece of stone						
A - Games and play						
A1. Doll	14.3	3.4	7.9	4.5	8.3	-
A2. Throw in air	8.0	0.0	9.6	3.4	6.2	-
A3. Wave in water	0.0	3.4	4.4	1.1	2.1	3
A4. As cricket ball	2.7	1.7	0.0	1.1	1.3	4
A5. As a hokey ball	2.7	1.7	0.0	0.0	1.1	4
B - Instrumental Use						
B1. Fire	28.6	8.7	22.8	10.2	19.3	-
B2. Grinding	1.8	1.7	4.4	3.4	2.9	3
B3. Sharpening	0.9	1.7	2.6	1.1	1.6	4
B4. Plucking	3.6	3.4	0.0	1.1	1.9	4
B5. Mirror	0.9	0.0	0.0	0.0	0.3	5
B6. To drive away the cattle	0.9	3.4	0.0	0.0	0.8	5
B7. To drive away the birds	0.0	1.7	0.0	0.0	0.3	5
B8. Hunting birds and animals.	4.5	10.2	3.5	6.8	5.6	-
C - Anti Social Use						
C1. Hurting	24.1	33.9	7.0	6.8	16.4	-
C2. Damaging	4.5	1.7	0.0	1.1	1.9	4
C3. weapons	1.8	5.1	2.6	8.0	4.0	1
C4. Use for Adulterate	1.8	1.7	5.3	0.0	2.4	3
D - Building Purpose						
D1. Repair	0.0	0.0	0.9	0.0	0.3	5
D2. Plugging holes	6.3	13.6	3.5	4.5	6.2	-

Activity-II Unusual uses : Problem:-1. Piece of stone						
Responses	EG %	EB %	TG %	TB %	TOT %	Origi. Weig.
D3. For making the house	67.9	78.0	68.4	71.6	70.5	-
D4. For making *gitty pieces*	16.1	33.9	24.6	27.3	24.1	-
D5. For making cement	1.8	0.0	1.6	5.7	2.4	3
D6. To railway track support	0.9	0.0	2.6	2.3	1.6	4
D7. Use in construction Projects & river banks	0.9	5.1	2.6	2.3	2.4	3
E - Defence Use						
E1. Defence	1.8	5.1	1.8	3.4	2.7	3
F - Decoration						
F1. As a show piece	16.1	32.2	16.7	14.8	18.5	-
F2. As a present	0.0	0.0	0.9	2.3	0.8	5
F3. To build path	0.9	3.4	19.3	12.5	9.7	-
F4. To make statues	17.0	1.7	39.5	27.3	23.9	-
F5. Painting with different colours	0.9	0.0	0.0	3.4	1.1	4
F6. Statue of the goddess	6.3	1.7	12.3	4.5	7.0	-
G - Weights						
G1. As paper weight	2.7	6.8	5.3	5.7	4.8	1
H - Scientific Use						
H1. To perform practical tests	1.8	1.7	0.9	1.1	1.3	4
H2. For sharpening the knife	0.0	1.7	0.9	0.0	0.5	5
H3. For finding the depth of water	0.9	0.0	0.9	0.0	0.5	5
I - Writing Use						
I1. For writing	1.8	1.7	2.6	0.0	1.6	4
J - Use as Support						
J1. Support	4.5	11.9	8.8	4.5	7.0	-
K - Miscellaneous						
K1. As a weight for measuring weight	0.9	1.7	0.9	2.3	1.3	4
K2. For cleaning utensils	0.0	0.0	0.0	1.1	0.3	5
K3. To make a *chulha* (Hearth)	3.6	1.7	3.5	1.1	2.7	3
K4. Design flour	0.0	0.0	0.9	1.1	0.5	5
K5. Make utensils	0.0	0.0	2.6	2.3	1.3	4
K6. For making the diamonds	0.9	5.1	8.8	3.4	4.6	1
PROBLEM: 2. Wooden stick						
A - Self-defence						
A1. Saving life	0.0	1.7	0.0	1.1	0.5	5
A2. Protection of wealth and property	1.8	1.7	0.9	4.5	2.1	3
A3. To drive away the dacoits and thieves	0.0	5.1	1.8	0.0	1.3	4
B - Anti-social Purpose						
B1. For hurting others	7.1	11.9	0.9	4.5	5.4	-
B2. As a weapon	1.8	6.8	1.8	3.4	2.9	3
C - As an accessory						
C1. For writing	0.9	0.0	0.0	2.3	0.8	5
C2. Plucking	0.9	1.7	0.9	2.3	1.3	4
C3. Flag hoisting	0.0	1.7	0.9	0.0	0.5	5
C4. For dusting the coat and clothes.	0.0	1.7	0.0	0.0	0.3	5
C5. For thrashing out the corn	0.9	0.0	0.0	1.1	0.5	5
C6. For driving away the dogs & animals	2.7	3.4	0.9	5.7	2.9	3
C7. For fishing in water	0.0	3.4	0.0	0.0	0.5	5
D - Support						
D1. For supporting	2.7	16.9	5.3	14.8	8.6	-
D2. Hanging things	0.9	3.4	1.8	1.1	1.6	4
D3. Support for an old man	12.9	15.3	13.2	23.9	15.8	-
D4. Support for the invalid	0.9	1.7	10.5	9.1	5.9	-
E - Games & sports						
E1. Use as pole vault	0.9	3.4	0.9	1.1	1.3	4
E2. Magic stick	0.9	1.7	0.0	0.0	0.5	5
E3. To learn stick playing *(Gatka)*	0.9	0.0	0.0	0.0	0.3	5
E4. To play hockey & cricket with the stick	2.7	11.9	3.5	9.1	5.9	-
E5. To play *Gullidanda* (Play with long and small sticks)	0.0	1.7	1.8	4.5	1.9	4
F - Decoration						
F1. As baton	1.8	8.5	1.8	3.4	3.2	2
F2. Gift pieces	3.6	3.4	7.0	4.5	4.8	1

PROBLEM: 2. Wooden stick						
Responses	EG %	EB %	TG %	TB %	TOT %	Orig. Weig.
F3. Toys	24.1	5.1	33.3	18.2	22.5	-
F4. kites	0.0	0.0	0.0	1.1	0.3	5
G - Measurement						
G1. As foot	1.8	1.7	0.0	1.1	1.1	4
G2. For measuring length	3.6	3.4	5.3	3.4	4.0	1
G3. For measuring cloth etc	0.0	0.0	0.9	0.0	0.3	5
H - Domestic Use						
H1. House building & huts	62.5	44.1	72.8	56.8	61.4	-
H2. Furniture	73.2	37.3	53.5	36.4	52.8	-
H3. To make hole	0.0	0.0	0.9	1.1	0.5	5
H4. Burning & cooking	25.0	54.2	26.3	25.0	30.0	-
H5. Ladder	6.3	3.4	1.8	5.7	4.3	1
H6. Support to railway track	0.0	0.0	3.5	2.3	1.6	4
H7. Photo Frames	0.9	0.0	0.0	0.0	0.3	5
H8. Cot	1.8	0.0	7.0	4.5	3.8	2
I - Miscellaneous						
I1. Built rivers bridge	0.9	5.1	1.8	3.4	2.4	3
I2. For driving cattle	1.8	0.0	0.0	1.1	0.8	5
I3. Punishing the students	21.4	50.8	13.2	20.5	23.3	-
I4. Making perfumes	3.6	0.0	2.6	1.1	2.1	3
I5. Paper making	0.9	0.0	12.3	8.0	5.9	-
I6. Pens and pencils making	6.3	5.1	7.9	3.4	5.9	-
I7. Hammer handle	0.0	0.0	0.0	1.1	0.3	5
J - Making things						
J1. Boats	7.1	5.1	6.1	11.4	7.5	-
J2. Flute	0.9	0.0	1.8	0.0	0.8	5
J3. Beat the drum	0.0	0.0	0.0	1.1	0.3	5
J4. Making coal	0.0	1.7	0.0	1.1	0.5	5
J5. Mixing	0.0	0.0	1.8	2.3	1.1	4
J6. Bullock cart	3.6	3.4	2.6	1.1	2.7	3
PROBLEM: 3. Water						
A - Saving of life						
A1. Man	68.1	54.2	54.4	53.4	58.4	-
A2. Animal	38.4	20.3	39.5	26.1	33.0	-
A3. Plant	41.1	39.0	36.0	19.3	34.0	-
B - For Cleaning Purposes						
B1. Washing clothes	30.4	32.2	12.3	17.0	22.0	-
B2. Bath	28.6	28.8	15.8	18.2	22.3	-
B3. Cleaning wounds	0.9	1.7	0.9	1.1	1.1	4
B4. Cleaning (general)	7.1	11.9	6.1	9.1	8.0	-
B5. Sprinkling before brooming	0.9	0.0	0.0	0.0	0.3	5
B6. Washing the floor	14.3	8.5	7.0	4.5	8.8	-
C - Play and Fun						
C1. Swimming	2.7	11.9	0.0	3.4	3.5	2
C2. Sailing	1.8	1.7	2.6	9.1	3.8	2
C3. Fountains	0.0	1.7	0.9	0.0	0.5	5
C4. Throwing on others	0.9	0.0	0.0	0.0	0.3	5
C5. Playing with colours in *Holi* (Festival)	1.8	1.7	0.9	0.0	1.1	4
D - Industrial Uses						
D1. Solvent	0.9	1.7	3.5	3.4	2.4	3
D2. Steam	2.7	1.7	7.0	9.1	5.4	-
D3. Ice	0.0	0.0	0.9	4.5	1.3	4
D4. Mixing	2.7	3.4	2.6	1.1	2.4	3
D5. Used in the preparation of chemical compounds	3.6	6.8	10.5	5.7	6.7	-
D6. In the preparation of medicines	0.9	1.7	2.6	1.1	1.6	4
D7. Vehicles cooling the machinery	1.8	3.4	1.8	4.5	2.7	3
E - Destructive Use						
E1. Killing	0.0	3.4	0.0	1.1	0.8	5
E2. Floods	0.9	0.0	0.0	0.0	0.3	5
F - Domestic and Everyday Use						
F1. Extinguisher	1.8	5.1	0.9	4.5	2.7	3

PROBLEM: 3. Water						
Responses	EG %	EB %	TG %	TB %	TOT %	Originality Weight
F2. Cooking	0.9	1.7	3.5	5.7	2.9	3
F3. Kneading the flour	0.9	3.4	0.9	0.0	1.1	4
F4. Bring the unconscious person to senses	0.0	0.0	0.0	1.1	0.3	5
F5. Making sweet drinks	2.7	5.1	0.9	1.1	2.1	3
G - Miscellaneous Uses						
G1. Irrigation	24.1	20.3	38.6	27.3	28.7	-
G2. Digestion	0.0	0.0	0.0	1.1	0.3	5
G3. Drinking	25.0	39.0	26.3	14.8	25.2	-
G4. Cooking	26.8	22.0	8.8	6.8	15.8	-
G5. To see image in water	0.0	0.0	1.8	0.0	0.5	5
G6. Producing salt	2.7	1.7	9.6	10.2	6.4	-
G7. Use in building construction	17.9	20.3	19.3	19.3	19.0	-
G8. For producing electricity	13.4	20.3	41.2	37.5	28.7	-
G9. Used in science experiments	3.6	0.0	0.0	0.0	1.1	4
G10. Essential for evaporation and then for the formation of cloud	0.9	1.7	9.6	12.5	6.4	-
G11. For breeding fishes	2.7	1.7	8.8	10.2	6.2	-
G12. In aquarium	0.0	0.0	1.8	1.1	0.8	5
Similarities : 1. Tree and House						
A - Commonness in Physical Characteristics						
A1. Rigidity	7.1	5.1	7.9	4.5	6.4	-
A2. Strength	0.0	0.0	2.6	1.1	1.1	4
A3. Can be demolished	3.6	15.3	6.1	4.5	6.4	-
A4. Need ground	5.4	5.1	0.0	4.5	3.5	2
A5. Have foundation	0.9	1.7	5.3	5.7	3.5	2
A6. Have climatic effect	3.6	1.7	3.5	2.3	2.9	3
A7. Can be burnt	0.9	5.1	0.9	0.0	1.3	4
A8. Both taller than man	0.0	1.7	0.0	0.0	0.3	5
A9. Not fall in ill	0.0	1.7	0.0	0.0	0.3	5
A10. Both can build by human being	0.0	1.7	1.8	2.3	1.3	4
A11. Both are not afraid of enemy	0.9	0.0	0.9	1.1	0.8	5
A12. Both occupy space	0.0	0.0	0.0	1.1	0.3	5
A13. Both have definite shape and size	0.0	0.0	1.8	1.1	0.8	5
A14. Both have wood content	9.8	6.8	9.6	10.2	9.4	-
B - Place of Frequent Visits						
B1. For birds	2.7	6.8	24.6	6.8	11.0	-
B2. For evil spirits	0.9	1.7	0.9	1.1	1.1	4
B3. For man	1.8	0.0	1.8	0.0	1.1	4
B4. For animal	0.9	0.0	0.9	0.0	0.5	5
B5. For insects	0.0	0.0	0.0	1.1	0.3	5
B6. Tired Travellers	0.9	1.7	0.9	0.0	0.8	5
B7. Strangers	0.0	0.0	0.9	0.0	0.3	5
C - Shelter						
C1. Living	45.5	39.0	55.3	35.2	45.0	-
C2. For shade	39.3	33.9	67.5	68.2	53.9	-
C3. For hiding	0.9	1.7	6.1	6.8	4.0	1
C4. Protect against enemies and thieves	2.7	1.7	5.3	3.4	3.5	2
C5. As a protection against rain and storm	16.1	16.9	27.2	33.0	23.6	-
D - Place for Entertainment						
D1. Debates	0.0	0.0	0.9	0.0	0.3	5
E - Educational use						
E1. Both can be used as a class room	0.0	0.0	0.9	1.1	0.5	5
E2. For organizing debate competition in both	0.0	0.0	0.9	0.0	0.3	5
F - Miscellaneous						
F1. Both require water in the beginning stage of development	7.1	5.1	7.0	3.4	5.9	-
F2. Both have limited life	0.0	1.7	1.8	0.0	0.8	5
F3. Both are affected by storms	3.6	6.8	5.3	3.4	4.6	1
F4. No talking	0.9	5.1	1.8	1.1	1.9	4

Similarities: 2. Chair and Ladder						
Responses	EG %	EB %	TG %	TB %	TOT %	Originality Weight
A -Commonness in Physical Characteristics						
A1. Breakability	3.6	13.6	3.5	2.3	4.8	1
A2. Made of wood	17.9	40.7	43.0	39.8	34.3	-
A3. Both have legs	0.0	1.7	3.5	4.5	2.4	3
A4. May fall down	0.0	0.0	0.9	1.1	0.5	5
A5. Moveable	2.7	0.0	2.6	1.1	1.9	4
A6. Not movable itself	0.9	5.1	4.4	4.5	3.5	2
A7. Made of steel	0.0	0.0	1.8	1.1	0.8	5
A8. Both have definite shape and size	0.9	0.0	0.0	0.0	0.3	5
A9. Both occupy space	0.0	1.7	1.8	1.1	1.1	4
A10. Both can be damaged	0.0	0.0	0.9	0.0	0.3	5
A11. With care life of both can be extended	0.0	1.7	0.9	0.0	0.5	5
B - Commonness in Everyday Use						
B1. Sitting	53.6	54.2	58.8	67.0	58.4	-
B2. Climbing	65.2	54.2	77.2	75.0	69.4	-
B3. Stand	0.0	0.0	0.0	1.1	0.3	5
C - Use in Games						
C1. Games	0.0	0.0	2.6	0.0	0.8	5
C2. Sports	0.0	0.0	1.8	1.1	0.8	5
D - Sundry Responses						
D1. Lifeless	12.5	15.3	9.6	5.7	10.5	-
E - Miscellaneous						
E1. Both are used for cleaning houses	6.3	0.0	0.9	3.4	2.9	3
E2. Both are bad conductors of electricity	0.0	1.7	0.0	1.1	0.5	5
E3. Both can be burnt	0.9	3.4	0.9	1.1	1.3	4
E4. Both are made by the carpenter	2.7	6.8	2.6	8.0	4.6	1
E5. Both are use painting	11.6	1.7	6.1	11.4	8.3	-
Similarities : 3. Air and Water						
A - Essential for life						
A1. Essential	54.5	57.6	64.9	54.5	58.2	-
A2. Useful	10.7	3.4	2.6	5.7	5.9	-
A3. Essential for animal, men and plants	36.6	23.7	19.3	29.5	27.6	-
A4. Both are transparent	0.0	0.0	1.8	0.0	0.5	5
B - Commonness in Chemical Properties						
B1. Can be mixed	0.9	1.7	3.5	9.1	3.8	2
B2. Both have oxygen	13.4	27.1	9.6	3.4	12.1	-
B3. Fluid	0.0	0.0	0.0	1.1	0.3	5
B4. Fluent flow	0.0	3.4	1.8	5.7	2.4	3
B5. No size	0.0	0.0	1.8	0.0	0.5	5
B6. Expand on heating	0.0	0.0	0.0	1.1	0.3	5
B7. Found everywhere	1.8	3.4	3.5	2.3	2.7	3
B8. Both can be impure	0.9	1.7	5.3	3.4	2.9	3
B9. Both can be used in cool drinks	0.0	3.4	0.0	0.0	0.5	5
B10. Both can not have colour and smell	2.7	6.8	6.1	1.1	4.0	1
B11. Both have weight	1.8	0.0	0.9	1.1	1.1	4
B12. Both occupy space	1.8	0.0	0.0	1.1	0.8	5
B13. No shape	0.0	3.4	2.6	2.3	1.9	4
C - Medium of Transfer						
C1. Disease	2.7	0.0	1.8	1.1	1.6	4
C2. Micro germs	0.0	0.0	5.3	2.3	2.1	3
C3. Virus	0.0	0.0	1.8	1.1	0.8	5
D - Agents of Change						
D1. Climatic	0.0	0.0	6.1	1.1	2.1	3
D2. Cooling agent	0.0	3.4	1.8	1.1	1.3	4
D3. Both melt some things	0.9	0.0	0.9	0.0	0.5	5
E - Extinguisher						
E1. To extinguish fire	0.9	0.0	0.9	3.4	1.3	4
F - Industrial uses						
F1. Used in chemistry	0.0	0.0	1.8	0.0	0.5	5
F2. Used in Science Laboratory	0.9	1.7	1.8	2.3	1.6	4
F3. Both are used in scientific experiments	0.0	0.0	0.0	0.0	0.3	5

Similarities : 3. Air and Water						
Responses	EG %	EB %	TG %	TB %	TOT %	Originality Weight
F4. Both can use in vehicles	0.0	0.0	0.9	0.0	0.3	5
G - Miscellaneous						
G1. Both are lifeless	0.9	1.7	4.4	5.7	3.2	2
G2. Both are useful for germination	0.9	1.7	0.0	1.1	0.8	5
G3. Both can create havoc in extreme forms	0.9	1.7	6.1	4.5	3.5	2
G4. Both can create power and energy	1.8	1.7	10.5	14.8	7.5	-
G5. Both are useful for sailing	0.9	0.0	0.9	2.3	1.1	4
G6. Both are useful in Agriculture	0.9	0.0	0.0	1.1	0.5	5
G7. Both are use rain falling	0.0	0.0	1.8	4.5	1.6	4
G8. Both use in aquarium	0.9	0.0	0.9	0.0	0.5	5
G9. Breath to fisher	0.9	0.0	1.8	0.0	0.8	5
G10. Both can use in cleaning	0.9	6.8	0.0	0.0	1.3	4
G11. Both are gift of nature	3.6	16.9	1.8	4.5	5.4	-
G12. Both are no money spend to use	0.0	0.0	0.9	0.0	0.3	5
Product improvement : Imagine a simple model of horse						
A - Technical Arrangements						
A1. Sound of braying	0.0	0.0	0.9	1.1	0.5	5
A2. Shaking of neck	0.0	3.4	0.0	0.0	0.5	5
A3. Key arrangement for motion	0.9	3.4	0.0	0.0	0.8	5
A4. Automatic movement of feet like the actual horse	1.8	0.0	0.9	0.0	0.8	5
A5. Spring arrangement for jumping movement	0.0	5.1	0.9	0.0	1.1	4
A6. Machine arrangements for jumping	0.0	1.7	0.0	0.0	0.3	5
A7. Talking arrangement	0.9	1.7	4.4	1.1	2.1	3
A8. Horse play	1.8	0.0	0.0	0.0	0.5	5
A9. Swimming system	0.0	0.0	0.0	2.3	0.5	5
B - Construction Material						
B1. Iron	0.9	0.0	0.0	0.0	0.3	5
B2. Wood	0.9	3.4	0.0	0.0	0.8	5
B3. Made up of aeroplane's metal	0.0	1.7	0.0	0.0	0.3	5
B4. Paper	4.5	1.7	0.9	0.0	1.9	4
C - Decoration						
C1. Paint	7.1	16.9	10.9	10.2	10.5	-
C2. Garland	0.0	0.0	3.5	0.0	1.1	4
C3. Sticking of pearls on horse	0.0	3.4	2.6	2.3	1.9	4
C4. Sticking of shining glass pieces	3.6	1.7	4.4	4.5	3.8	2
C5. Decoration with ornaments	11.6	10.2	27.2	11.4	16.1	-
C6. Decoration with beautiful garments	24.1	27.1	36.8	18.2	27.1	-
C7. *Panji*l in feet	0.0	5.1	10.5	11.4	6.7	-
C8. Beautiful bridle in the mouth	0.0	1.7	4.4	4.5	2.7	3
C9. Natural hairs on the body's parts	5.4	5.1	3.5	4.5	4.6	1
C10. Sound producing *Panjil*	0.9	0.0	1.8	0.0	0.8	5
C11. Decoration with flower and leaf	7.1	6.8	12.3	4.5	8.0	-
C12. Clothing with shirt and pants	0.0	3.4	21.1	17.0	11.0	-
C13. Crown on the head	9.8	1.7	5.3	13.6	8.0	-
C14. Long and natural hairs on the tail	0.0	0.0	0.0	1.1	0.3	5
C15. *Ghunguru* in feet	10.7	1.7	27.2	22.7	17.2	-
C16. Sticking of some piece of radium on some body parts	0.0	3.4	0.0	1.1	0.8	5
C17. Gold plating the body surface	0.9	0.0	0.9	0.0	0.5	5
C18. *Ghunguru* in neck	14.3	8.5	37.7	22.7	22.8	-
C19. Multicoloured pad on body parts	8.0	1.7	2.6	3.4	4.3	1
C20. Sticking of diamond on body parts	0.9	0.0	1.8	0.0	0.8	5
C21. Beautiful sheet on the back	4.5	0.0	1.8	3.8	3.8	2
C22. Wearing socks & shoes	3.6	0.0	18.4	13.6	9.9	-
C23. Rings on ear	0.9	0.0	20.2	9.1	8.6	-
C24. Tie ribbon to tail	0.0	3.4	10.5	8.0	5.6	-
D - Making body parts Unusual						
D1. Unusual nose	0.0	0.0	0.9	0.0	0.3	5
D2. Wings	9.8	10.2	27.2	27.3	19.3	-
D3. Illuminating eye	0.0	1.7	0.0	0.0	0.3	5
D4. Legs	0.0	0.0	0.9	1.1	0.5	5

Product improvement : Imagine a simple model of horse						
Responses	EG %	EB %	TG %	TB %	TOT %	Originality Weight
D5. Long and big tail	0.0	5.1	0.9	0.0	1.1	4
D6. Big size of the horse	0.0	0.0	0.9	0.0	0.3	5
D7. Shape and size of horse according to needs of children	0.9	1.7	0.9	0.0	0.8	5
D8. Long neck	0.9	0.0	0.0	1.1	0.5	5
D9. Moustaches	0.0	0.0	0.0	1.1	0.3	5
E - Adding New Things						
E1. Cart	0.9	0.0	0.0	2.3	0.8	5
E2. Wheels	2.7	6.8	7.9	6.8	5.9	-
E3. Radio	0.0	1.7	0.0	1.1	0.5	5
E4. Saddle	0.0	3.4	1.8	3.4	1.9	4
E5. Spectacles	1.8	0.0	10.5	9.1	5.9	-
E6. Seat	0.0	3.4	0.0	1.1	0.8	5
E7. Bridle	0.9	0.0	0.9	1.1	0.8	5
E8. Bell	1.8	8.5	8.8	5.7	5.9	-
E9. Tusks	0.0	0.0	4.4	3.4	2.1	3
E10. Watch	0.0	0.0	2.6	0.0	0.8	5
E11. Umbrella	0.9	0.0	0.0	0.0	0.3	5
E13. T.V	0.0	0.0	0.0	1.1	0.3	5
F - Unusual Postures						
F1. Dancing	0.0	0.0	1.8	0.0	0.5	5
F2. Jumping	0.0	0.0	0.0	1.1	0.3	5
G - Motion Arrangement						
G1. Moveable	0.0	3.4	0.0	0.0	0.5	5
G2. Able to run	0.9	3.4	0.9	1.1	1.3	4
G3. Flying in the air	0.9	1.7	1.8	2.3	1.6	4
G4. Swimming in the water	0.0	1.7	0.0	0.0	0.3	5
H - Electrification						
H1. Electrification	0.9	0.0	0.0	0.0	0.3	5
H2. Arrangement of multicoloured bulbs	0.0	6.8	0.9	2.3	1.9	4
H3. Movement by electricity	0.0	3.4	0.0	0.0	0.5	5
H4. Electric arrangement of producing sound on the back	0.9	0.0	0.0	0.0	0.3	5
H5. Electric arrangement for rhythmical dancing	1.8	0.0	0.0	0.0	0.5	5
H6. Natural movement of the rider on the back of horse should be electrically operated	0.0	3.4	0.0	0.0	0.5	5
H7. computerised	0.9	0.0	0.0	2.3	0.8	5
I - Magnetization						
I1. Magnetic arrangement for automatic riding of doll on the back of horse	0.0	0.0	0.9	0.0	0.3	5
J - Atomic equipments						
J1. Movement of horse by atomic energy	0.0	0.0	0.0	1.1	0.3	5
K - Eating and drinking etc.,						
K1. Making small pieces of grasses during intake	0.0	0.0	1.8	0.0	0.5	5

Appendix-C2

Responses in the Non-verbal Creativity Test items.

Note: EG = English medium girls (N=112) EB = English medium boys (N=59)
TG = Telugu medium girs (N=114) TB = Telugu medium boys (N=88))
Tot % = Total (both media) (N=373) Orig. Wei.= Originality weight.

Activity I-(1) : Picture Construction

Response	EG	EB	TG	TB	Both Total	Total %	Orig. wei.	Response	EG	EB	TG	TB	Both Total	Total %	Orig. wei.
1 Balloon	0	0	1	1	2	0.54	5	24 Ladies hand	2	1	0	0	3	0.80	5
2 Basket	3	0	3	2	8	2.14	3	bag							
3 Boat	0	1	1	1	3	0.80	5	25 Loud-speaker	0	0	0	1	1	0.27	5
4 Bucket	0	0	1	0	1	0.27	5	26 Moon	0	0	0	1	1	0.27	5
5 Bulb shade	1	1	0	0	2	0.54	5	27 Mosquito/Bee	0	0	0	1	1	0.27	5
6 Cage	0	0	1	1	2	0.54	5	28 Mushroom	0	0	0	1	1	0.27	5
7 Cartoon	2	0	1	0	3	0.80	5	29 Parachute	3	0	2	1	6	1.61	4
8 Cave	1	0	0	0	1	0.27	5	30 Post Box	5	3	0	0	8	2.14	3
9 Clock	0	1	0	0	1	0.27	5	31 Pot	0	0	3	0	3	0.80	5
10 Coconut	0	0	0	1	1	0.27	5	32 Protractor	5	2	2	2	11	2.95	3
11 Cup	1	0	4	2	7	1.88	4	(Geometrical							
12 Earthen lamp	1	0	4	1	6	1.61	4	.Instrument for							
13 Face	0	1	5	10	16	4.29	1	measuring angles)							
14 Flowerpot	3	1	7	0	11	2.95	3	33 Sun	14	11	9	24	58	15.55	-
15 Fruit	1	0	0	0	1	0.27	5	34 Top	0	0	0	1	1	0.27	5
16 Geometrical	0	1	1	1	3	0.80	5	35 Tortoise	5	1	4	0	10	2.68	3
Figure								36 Umbrella	4	2	1	0	7	1.88	4
17 Hand fan	1	0	1	1	3	0.80	5	37 Wheel	0	1	0	0	1	0.27	5
18 Hat	2	4	0	4	10	2.68	3	38 Window/Door	0	2	1	0	3	0.80	5
19 Head	15	7	12	7	41	10.99	-	39 Wire mesh	0	0	1	0	1	0.27	5
20 Helmet	2	1	0	0	3	0.80	5	0 Irrelevant or	20	7	27	8	62	16.62	-
21 Hut	11	5	13	7	36	9.65	-	meaningless							
22 Ice cream	4	2	4	7	17	4.56	1	figures							
23 Igloo	6	4	4	3	17	4.56	1								

Activity I-(2) : Picture Construction

1 Board	3	2	1	4	10	2.68	3	13 Mat	3	0	2	0	5	1.34	4
2 Book	2	0	0	1	3	0.80	5	14 RCC building	3	2	2	1	8	2.14	3
3 Box	12	10	12	6	30	10.72	-	slab							
4 Cartoon	1	0	1	0	2	0.54	5	15 Sweet	2	0	1	0	3	0.80	5
5 Chair	0	0	5	5	10	2.68	3	16 Table	10	7	7	16	40	10.72	-
6 Cuboid	0	1	0	0	1	0.27	5	17 Tent	0	3	0	3	6	1.61	4
7 Diamond	2	6	0	3	11	2.95	3	18 Tin	10	4	10	13	37	9.92	-
8 Fish	10	1	15	1	27	7.24	-	19 Washing	0	1	0	0	1	0.27	5
9 Hut	0	4	4	4	12	3.22	2	machine							
10 Ice piece	0	1	0	0	1	0.27	5	20 Wrist watch	0	0	0	1	1	0.27	5
11 Kite	9	5	9	7	30	8.04	-	0 Irrelevant or	44	12	45	23	124	33.24	-
12 Leaf	1	0	0	0	1	0.27	5	meaningless							
								figures							

Appendix-C2

Activity II-(1) : Picture Completion

Activity II-(1) : Picture Completion

Response	EG	EB	TG	TB	Both Total	Total %	Origi. Wei.	Response	EG	EB	TG	TB	Both Total	Total %	Origi. Wei.
1 Arrow	0	1	0	2	3	0.80	5	11 Hut	7	7	9	4	27	7.24	-
2 Bell (in temple)	0	0	1	0	1	0.27	5	12 Leaf	7	0	5	0	12	3.22	2
3 Book	0	1	5	7	13	3.47	5	13 Plant	20	1	22	11	54	14.48	-
4 Bulb-shade	0	0	2	0	2	0.54	5	14 Shirt	10	7	4	4	25	6.70	-
5 Butterfly	2	0	1	0	3	0.80	5	15 Sign-board	0	2	0	1	3	0.80	5
6 Fencing	0	1	0	0	1	0.27	4	16 Stethoscope	0	0	1	0	1	0.27	5
7 Flag/ Lamppost	2	2	0	1	5	1.34	- 5	17 Temple	0	0	0	1	1	0.27	5
8 Funnel	9	6	5	5	25	6.70	5	18 Tin	0	0	0	2	2	0.54	5
9 Hive	1	0	0	0	1	0.27		19 Toy	1	0	0	0	1	0.27	5
10 Hunting instrument (Y-shaped)	0	0	0	1	1	0.27	-	20 Tree with flowers/fruits	3	2	3	3	11	2.95	3
								0 Irrelevant or Meaningless figures	50	29	56	46	181	48.53	-

Activity II-(2) : Picture Completion

1 Bell	1	1	0	0	2	0.54	5	12 Lollipop	0	0	0	1	1	0.27	5
2 Bulb	1	1	1	5	8	2.14	3	13 Man	1	2	4	9	16	4.29	1
3 Butterfly /Insect	0	1	6	0	7	1.88	4	14 Mango	1	1	0	0	2	0.50	5
								15 Mike	0	0	0	1	1	0.27	5
4 Drum beater	0	0	1	2	3	0.80	5	16 Pendulum	0	0	4	1	5	1.34	4
5 Dumbbell	0	6	0	2	8	2.14	3	17 Plant	1	0	7	4	12	3.22	2
6 Fan	3	0	0	2	5	1.34	4	18 Rattle	0	0	0	1	1	0.27	5
7 Flower	79	24	52	27	182	48.79	-	(Playing thing)							
8 Flowerpot	1	0	1	0	2	0.54	5	19 Screw	0	0	0	1	1	0.27	5
9 Handle for pump	0	1	0	0	1	0.27	5	20 Stick	1	1	1	2	5	1.34	4
								21 Stool	0	1	0	0	1	0.27	5
10 Hand pump	3	0	0	0	3	0.80	5	0 Irrelevant or Meaningless	11	13	20	21	65	17.43	-
11 Key	9	7	17	9	42	11.26	-	figures							

Activity II-(3) : Picture Completion

1 Balloon	5	1	2	0	8	2.14	3	11 Ground nut	0	0	1	0	1	0.27	5
2 Bird	0	0	1	1	2	0.54	5	12 Insect	6	1	6	1	14	3.75	2
3 Bunch of grapes	5	0	3	0	8	2.14	3	13 Parachute	0	8	7	11	26	6.97	-
								14 Speed	0	0	0	1	1	0.27	5
4 Butterfly	2	0	0	0	2	0.54	5	breaker							
5 Chain	0	0	1	0	1	0.27	5	15 Tamarind	1	7	2	2	12	3.22	2
6 Cloud	33	12	42	38	125	33.51	-	16 Temple	0	2	0	0	2	0.54	5
7 Elephant	2	0	0	3	5	1.34	4	17 Tree	2	1	3	1	7	1.88	4
8 Face	0	1	4	1	6	1.61	4	18 Umbrella	23	13	3	7	46	12.33	-
9 Flower pot	0	0	2	0	2	0.54	5	0 Irrelevant or	33	12	37	21	103	27.61	-
10 Folded hand	0	1	0	1	2	0.54	5	Meaningless figures							

Activity II-(4) : Picture Completion

1 Balloon	6	0	5	0	11	2.95	3	8 Dumbbell	3	0	1	3	7	1.88	4
2 Bat	8	0	5	2	15	4.02	1	9 Earthen lamp	0	0	1	0	1	0.27	5
3 Beaker	2	3	3	3	11	2.95	3	10 Face	1	0	4	2	7	1.88	4
4 Bird head & Mouth	2	1	0	2	5	1.34	4	11 Fruit	4	1	3	1	9	2.41	3
								12 Guitar	0	1	0	0	1	0.27	5
5 Blouse	0	1	2	1	4	1.07	4	13 Hand fan	1	0	0	0	1	0.27	5
6 Bottle	0	0	0	2	2	0.54	5	14 Hanger	0	0	0	1	1	0.27	5
7 Cap	0	0	0	2	2	0.54	5	15 Hook	0	0	1	0	1	0.27	5

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Activity II-(4) : Picture Completion

Response	EG	EB	TG	TB	Both Total	Total %	Origi wei.	Response	EG	EB	TG	TB	Both Total	Total %	Origi.wei.
16 Key	6	3	4	1	14	3.75	2	25 Scythe	24	11	12	19	66	17.69	-
17 Lollipop	4	0	1	1	6	1.61	4	26 Snake charmer's flute	0	1	0	0	1	0.27	5
18 Magnifying glass	2	6	3	1	12	3.22	2	27 Spectacles	0	3	2	2	7	1.88	4
19 Man	8	3	1	2	14	3.75	2	28 Spoon	2	1	5	3	11	2.95	3
20 Net (fishes)	0	0	1	0	1	0.27	5	29 Tree	0	2	6	1	9	2.41	3
21 Phone receiver	0	2	1	0	3	0.80	5	0 Irrelevant or	38	16	50	36	140	37.53	-
22 Question mark	0	3	0	1	4	1.07	4	Meaningless figures							
23 Roller	0	1	0	0	1	0.27	5								
24 Sauce pan with handle	1	0	3	2	6	1.61	4								

Activity II-(5) : Picture Completion

1 Arrow	0	0	0	2	2	0.54	5	8 Temple	3	0	0	0	3	0.80	5
2 Books row	1	4	5	5	15	4.02	1	9 Train passing over the bridge	0	0	1	0	1	0.27	5
3 Gift box/Box	0	2	5	2	9	2.41	3								
	80	32	67	44	223	59.79	-	10 Water-fall	1	0	0	0	1	0.27	5
4 Hut	0	0	1	1	2	0.54	5	0 Irrelevant or	27	21	33	33	114	30.56	-
5 Lamp-post	0	0	1	1	2	0.54	5	Meaningless figures							
6 Motor car	0	0	1	0	1	0.27	5								
7 Table															

Activity II-(6) : Picture Completion

1 Birthday	7	0	1	1	9	2.41	3	10 Garden	10	0	5	4	19	5.09	-
candles	0	0	2	0	2	0.54	5	11 Half shirt	1	0	0	0	1	0.27	5
2 Book	2	0	5	4	11	2.95	3	12 Leader's munch	0	0	0	1	1	0.27	5
3 Building	1	1	1	0	3	0.80	5	13 Rain	3	8	8	4	23	6.17	-
4 Bulb shade	1	1	0	0	2	0.50	5	14 Tree and stick	3	0	2	4	9	2.41	3
5 Cells	0	1	0	1	2	0.50	5	15 Wall	12	4	14	10	40	10.72	-
6 Crown	2	1	8	7	18	4.83	1	0 Irrelevant or	65	32	64	50	211	56.57	-
7 Design	0	1	0	1	2	0.54	5	Meaningless figures							
8 E(letter)	5	10	4	1	20	5.36	-								
9 Flag post															

Activity II-(7) : Picture Completion

1 Animal	1	0	2	3	6	1.61	4	9 Man	9	5	15	8	37	9.92	-
2 Basket	1	0	1	1	3	0.80	5	10 Rope	4	3	3	3	13	3.49	2
3 Bottle	0	1	0	1	2	0.54	5	11 Shell	1	0	0	4	5	1.34	4
4 Creeper	0	0	1	0	1	0.27	5	12 Snake	18	7	4	6	35	9.38	-
5 Earthen lamp	12	2	6	8	28	7.51	-	13 Telephone	0	0	0	3	3	0.80	5
6 Hot pack	5	0	1	1	7	1.88	4	wire/wire							
7 Insect	4	0	0	1	5	1.34	4	0 Irrelevant or	56	41	78	48	223	59.79	-
8 Lotus	1	0	3	1	5	1.34	4	Meaningless figures							

Activity II-(8) : Picture Completion

1 Animal	12	3	6	8	29	7.77	-	7 Insect	7	0	3	1	11	2.95	3
2 Bird	27	19	25	21	82	24.66	-	8 Leaf	1	0	1	0	2	0.54	5
3 Face (human)	22	12	29	27	90	24.13	-	9 Map	2	0	2	4	8	2.14	3
4 Fish	6	0	1	4	11	2.95	3	10 Trunk	0	0	0	1	1	0.27	5
5 Fish	0	1	0	0	1	0.27	5	0 Irrelevant or	34	24	44	22	124	33.24	-
6 Flower	1	0	3	0	4	1.07	4	Meaningless figures							

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Activity II-(9) : Picture Completion

Response	EG	EB	TG	TB	Both Total	Total %	Origi . wei.	Response	EG	EB	TG	TB	Both Total	Total %	Origin Wei.
1 Arrow	2	13	1	14	30	8.04	-	16 Kite	4	5	8	3	20	5.36	-
2 Bat	0	0	0	1	1	0.27	5	17 Leaves	2	0	1	0	3	0.80	5
3 Bird	3	1	4	3	11	2.95	3	18 M (letter)	0	0	1	0	1	0.27	5
4 Board	1	1	0	0	2	0.54	5	19 Pencil	3	1	1	2	7	1.88	4
5 Cap	1	1	2	0	4	1.07	4	20 Rat	0	0	3	3	6	1.61	4
6 Cartoon	3	1	1	2	7	1.88	4	21 Rocket	2	1	0	2	5	1.34	4
7 Chair	0	0	0	2	2	0.54	5	22 Star	1	0	1	4	6	1.61	4
8 Cone	0	0	1	0	1	0.27	5	23 Sweet	0	1	1	0	2	0.54	5
9 Drum (*nagara)*	0	1	0	1	2	0.54	5	24 Table	0	1	4	4	9	2.41	3
10 Fish	33	6	23	4	66	17.69	-	25 Tent	0	0	0	3	3	0.80	5
11 Flag	0	0	2	2	4	1.07	4	26 Tin	0	1	0	0	1	0.27	5
12 Flower pot	2	0	0	0	2	0.54	5	27 Triangle	0	0	0	1	1	0.27	5
13 Flower vase	1	0	1	0	2	0.54	5	0 Irrelevant or	52	18	50	33	153	41.02	-
14 Funnel	0	0	0	1	1	0.27	5	Meaningless							
15 House (hut)	2	7	9	3	21	5.63	-	figures							

Activity II-(10) : Picture Completion

1 Animal	0	0	1	3	4	1.07	4	10 Shoe	0	0	0	1	1	0.27	5
2 Bird	14	9	21	6	50	13.40	-	11 Snake	12	10	1	14	37	9.92	-
3 Creeper	1	1	0	0	2	0.54	5	12 Spectacles	0	2	1	0	3	0.80	5
4 Fish	3	4	7	4	18	4.83	1	13 Trident	0	0	0	1	1	0.27	5
5 Jug	4	2	4	4	14	3.75	2	14 Tube	1	0	1	0	2	0.54	5
6 Leaf	1	2	1	1	5	1.34	4	15 Vegetable	5	1	3	1	10	2.68	3
7 Mango	17	0	16	6	39	10.46	-	0 Irrelevant or	52	28	56	46	182	48.79	-
8 Rope	0	0	2	1	3	0.80	5	Meaningless							
9 Seed	2	0	0	0	2	0.54	5	figures							

Activity III-(1): Triangles

1 A (letter)	0	0	1	0	1	0.27	5	25 Hut	91	36	76	49	252	67.56	-
2 Aeroplane	0	2	0	0	2	0.54	5	26 Kite	32	6	24	7	69	18.50	-
3 Amulet	18	5	4	11	38	10.19	-	27 Lamp shade	2	1	0	0	3	0.80	5
4 Arrow	8	13	3	14	38	10.19	-	28 Letter-box	4	2	0	9	15	4.02	1
5 Bag	2	0	6	0	8	2.14	3	29 Nib	0	3	0	0	3	0.80	5
6 Balance	0	1	0	1	2	0.54	5	30 Pencil	7	2	0	1	10	2.68	3
7 Bed lamp	0	0	2	0	2	0.54	5	31 Post	0	0	2	0	2	0.54	5
8 Bell	2	0	2	3	7	1.88	4	32 Purse	2	0	2	1	5	1.34	4
9 Bicycle frame	0	0	0	2	2	0.54	5	33 Rocket	21	7	4	16	48	12.87	-
10 Cap	29	9	30	19	87	23.32	-	34 Sign-board	4	2	6	3	15	4.02	1
11 Cartoon	52	17	26	22	117	31.37	-	35 Snack	4	2	1	2	9	2.41	3
12 Chariot	0	0	1	0	1	0.27	5	36 Star	51	21	46	30	148	39.68	-
13 Clock	2	2	3	3	10	2.68	3	37 Sweet	1	2	3	2	8	2.14	3
14 Cone	1	1	1	0	3	0.80	5	38 Symbol	0	0	1	0	1	0.27	5
15 Design	11	2	19	7	39	10.46	-	39 Tape	1	0	0	0	1	0.27	5
16 Diamond	5	5	2	7	19	5.09	-	40 Temple	7	4	5	13	29	7.77	-
17 Drum(Nagara)	1	0	2	2	5	1.34	4	41 Tent	2	4	9	4	19	5.09	-
18 Fire cracker	8	16	20	25	69	18.50	-	42 Top	1	5	3	1	10	2.68	3
19 Fish	19	3	15	10	47	12.60	-	43 Tree	11	3	11	4	29	7.77	-
20 Flower pot	23	5	33	1	61	16.35	-	44 Wrist watch	0	0	2	2	4	1.07	4
21 Funnel	4	1	4	2	11	2.95	3	45 Writing	1	0	0	0	1	0.27	5
22 Geometrical	3	7	8	1	19	5.09	-	board							
figure								0 Irrelevant or	354	225	420	340	1339	-	-
23 Harpoon	0	0	0	1	1	0.27	5	meaningless							
24 Hat	0	0	0	1	1	0.27	5	figures							

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Activity III-(2): Ellipses

Response	EG	EB	TG	TB	Both Total	Total %	Origin. Wei.	Response	EG	EB	TG	TB	Both Total	Total %	Origin. Wei.
1 Animal	20	10	10	8	48	12.87	-	46 Lid	1	0	0	0	1	0.27	5
2 Bag	0	0	1	0	1	0.27	5	47 Lock/key	0	0	0	4	4	1.07	4
3 Bangle	3	2	2	1	8	2.14	3	48 Mirror	0	3	1	0	4	1.07	4
4 Basket	5	7	5	6	23	6.17	-	49 Musical	8	3	0	0	11	2.95	3
5 Battery cell	0	1	0	0	1	0.27	5	Instrument							
6 Button	0	0	1	0	1	0.27	5	50 Nest	4	4	3	0	11	2.95	3
7 Beaker	2	2	3	5	12	3.22	2	51 Net	7	1	4	5	17	4.56	1
8 Bearing	0	2	0	0	2	0.54	5	52 Number 8	0	0	2	0	2	0.54	5
9 Bell	0	1	1	3	5	1.34	4	53 Pitcher	0	0	0	1	1	0.27	5
10 Bird	16	1	10	5	32	8.58	-	54 Plate	8	5	8	3	24	6.43	-
11 Bottle	3	0	9	2	14	3.75	2	55 Pond	0	1	0	1	2	0.54	5
12 Bucket	14	6	17	21	58	15.55	-	56 Pot	40	15	51	32	138	37.00	-
13 Cocoons	3	0	0	0	3	0.80	5	57 Q alphabet	0	0	1	0	1	0.27	5
14 Chocolate	2	0	0	2	4	1.07	4	58 Ring	3	2	4	4	13	3.49	2
15 Clock	6	11	14	3	34	9.12	-	59 Shaving	0	0	0	1	1	0.27	5
16 Coconut	0	0	1	1	2	0.54	5	brush							
17 Coin	1	0	0	1	2	0.54	5	60 Shuttle cock	0	2	0	0	2	0.54	5
18 Cone	1	6	0	0	7	1.88	4	61 Sieve	0	0	2	2	4	1.07	4
19 Cup	34	1	35	21	91	24.40	-	62 Sign-board	0	1	0	2	3	0.80	5
20 Cylinder	1	5	4	1	11	2.95	3	63 Soap	2	0	7	2	11	2.95	3
21 Design	1	0	6	0	7	1.88	4	64 Solar	3	2	1	2	8	2.14	3
22 Dish/Vessel	15	4	15	18	52	13.94	-	system/Universe							
23 Drum	0	1	0	0	1	0.27	5	65 Spectacles	8	1	0	4	13	3.49	2
(Nagara)								66 Spoon	2	0	0	0	2	0.54	5
24 Earthen	6	3	5	8	22	5.90	-	67 Stone	1	6	5	3	15	4.02	1
lamp/lamp								68 Sun/Moon	17	5	27	22	71	19.03	-
25 Egg	38	19	33	23	113	30.29	-	69 Sweets	4	1	5	0	10	2.68	3
26 Elephant	3	0	0	0	3	0.80	5	70 Swimming	0	0	1	2	3	0.80	5
27 Eye	7	1	2	2	12	3.22	2	pool							
28 Face	34	11	37	23	105	28.15	-	71 table	15	4	11	5	35	9.38	-
29 Fan	3	4	0	7	14	3.75	2	72 Tablet	1	0	2	0	3	0.80	5
30 Filter	0	1	0	1	2	0.54	5	73 Tape	0	0	0	1	1	0.27	5
31 Flag post	1	0	1	0	2	0.54	5	recorder							
32 Flower	44	8	58	7	114	30.56	-	74 Tennis bat /	8	4	0	6	18	4.83	1
33 Flower pot	9	2	1	7	19	5.09	-	Shuttle bat							
34 Fruit	9	1	7	3	20	5.36	-	75 Tin	20	3	25	9	57	15.28	-
35 Funnel	0	0	1	1	2	0.54	5	76 Top	1	3	0	1	5	1.34	4
36 Geometrical	0	1	0	1	2	0.54	5	77 Torch lens	1	0	0	1	2	0.54	5
figure								78 Tub	2	0	1	1	4	1.07	4
37 Glass	21	9	31	20	81	21.72	-	79 Tube	0	2	5	2	9	2.41	3
38 Head dress	7	0	1	3	11	2.95	3	80 Vase	1	0	4	0	5	1.34	4
39 Ice cream	4	3	6	9	22	5.90	-	81 Vegetable	22	4	23	3	52	13.94	-
40 Insect	5	5	10	2	22	5.90	-	82 Water Drum	5	2	6	18	23	6.17	-
41 Joker	3	10	6	2	21	5.63	-	83 Well	3	5	11	8	27	7.24	-
cap/Cap								84 Wheel	7	5	4	8	24	6.43	-
42 Jug	20	1	19	5	45	12.06	-	85 Wrist watch	4	7	4	14	29	7.77	-
43 Key	2	2	0	2	6	1.61	4	0 Irregular or	246	181	226	233	886	-	-
44 Kids bank	0	0	1	0	1	0.27	5	meaningless							
45 Kidney	0	0	1	0	1	0.27	5	figures							

APPENDIX-D1

Pilot Study Results

Table – D1-T1 : Correlation of Test items with the Total Activity Scores and Grand total (N=75)

	Verbal Creative thinking			Non-Verbal Creative thinking		
Activity	Item	Corr. with activity total	Corr. With grand total	Item	Corr. With activity total	Corr. With grand total
I	1	0.858$	0.832$	1	0.833$	0.456$
	2	0.791$	0.714$	2	0.748$	0.362$
	3	0.833$	0.752$			
II	1	0.813$	0.703$	1	0.464$	0.401$
	2	0.884$	0.698$	2	0.499$	0.400$
	3	0.837$	0.711$	3	0.414$	0.375$
				4	0.528$	0.329£
				5	0.323£	0.363$
				6	0.306£	0.314£
				7	0.394$	0.277@
				8	0.489$	0.380$
				9	0.630$	0.535$
				10	0.451$	0.394$
III	1	0.792$	0.503$	1	0.697$	0.562$
	2	0.732$	0.639$	2	0.892$	0.613$
	3	0.799$	0.667$			
IV	1	1.00$$	0.516$			

$$ Perfect correlation $ Significant at 0.001 £ Significant at 0.01 @ Significant at 0.05

Table –D1-T2 : Correlation between test activities and total scores of Verbal and non verbal creativity.

Activity	Verbal creativity	Non-verbal creativity
I	0.931$	0.520$
II	0.825$	0.829$
III	0.776$	0.739$
IV	0.516$	

$ Significant at 0.001

Table – D1.T3: Correlation coefficient among various factors of verbal and non-verbal creativity scores of the sample N=75

	Verbal creativity				Non-verbal creativity		
Factors	Originality	Fluency	Flexibility	Total	Originality	Elaboration	Total
Verbal originality	-						
Verbal fluency	.834$	-					
Verbal flexibility	.837$	.972$	-				
Verbal total	.928$	.975$	.976$	-			
Non-verbal Originality	.340£	.400$	.405$	.398$	-		
	292@	.348£	.371£	.351£	.354£	-	
Non-verbal Elaboration	.384£	.455$	.472$	.455$	.823$	.823$	-
Composite (Verbal + Non-verbal)	.844$	.908$	.916$	.927$	.639$	.605$	.756$

Table - 7.17:Mean, SD and Range scores of Creativity and its components (N = 75)

Creativity components	Mean	SD	Range Mini Maxi
Verbal Originality	20.05	15.60	0 - 67
Verbal Fluency	26.45	12.82	0 - 57
Verbal Flexibility	18.97	9.22	0 - 40
Non-Verbal Originality	13.53	9.22	0 - 45
Non-Verbal Elaboration	28.48	9.22	9 - 65

Appendix-D2

D2.1 : Procedure for changing order of ranks into numerical scores

All the teachers were asked to rank the order of importance 1 to 15 from the list given in relation to their view of creative thinking, and to use number 1 to indicate their first choice. The ranks given by them were converted into score form by following the formula explained below.

It is often desirable to transmute orders of merit into units of amount or "scores". This may be done by means of tables, if we are justified in assuming normality for the trait. To illustrate, suppose 15 factors have been ranked by the teachers in order of importance for creativity definition, the most important being ranked 1, the least important for them being ranked 15. The formula for converting ranks into scores as follows:

percent position[1] = [100(R - 0.5)] / N

R = Rank given by an individual

N = Number of Individuals ranked

Suppose one teacher ranked all the 15(1 through 15) order of preferences, rank 1 has a percent position of [100 (1-0.5)]/15 or 3.33, and the score from the table-49[2] is 85. Similarly rank 15 has a percent position of [100(15-0.5)]/15 or 96.66, and the score from the same table-49[2] score is 15. In this way all the ranks from 2 to 14 were converted into scores.

To make conversion very simple for future use, the researcher prepared a conversion table which is presented in table-D2-T1. This table is used in the teachers questionnaire (see App.-H, Part-C, Q.no.1) for defining creativity definition and also used in Part-F for Q. no.7.

Example: Suppose a teacher makes his definition of creativity by giving his order of preferences from 1 to 15. For example he ranked 'imagination' as 1, 'original ideas' was ranked as 2, 'self-expression' ranked as 3..... in this way he marked 'unconscious process' as his 15th preference. Here, when the teacher has ranked all items (1-15), the respective scores for each item can be drawn from the table-D2-T1. The 'Imagination' score is 85 (rank 1), the 'original ideas' score is 75 (2nd rank), and the 'self-expression' (3rd) score is 69. The unconscious process will score only 15 (15th rank). If the teacher ranks 1 to 14 the

[1] Garrett,H.E 1981, pp.330-333

[2] Ibid p.329

row scores 1-14 (table-D2-T1) and if the teacher ranks only 1 to 5 then the scores (row 1-5) will be given for items with respect to their ranks. Table-D2-T1 explains the calculation procedure for 'imagination'. Suppose 17 teachers ranked the 'imagination', giving it different ranks, they have been converted into scores from tables-D2-T1.

Table–D2-T1: Conversion table from order of ranks into numerical scores

Items ranked Min-Max	**Ranks and their respective scores** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
1	50
1-2	63 37
1-3	69 50 31
1-4	72 56 43 27
1-5	75 60 50 39 24
1-6	77 63 54 45 36 22
1-7	78 65 57 50 42 34 21
1-8	80 67 59 53 47 40 32 20
1-9	80 68 61 55 50 44 38 31 19
1-10	81 70 63 57 52 47 42 36 29 18
1-11	82 71 64 59 54 50 45 40 35 28 17
1-12	83 72 66 60 56 52 47 43 39 33 27 16
1-13	84 73 66 62 57 53 50 46 42 37 32 26 15
1-14	84 74 68 63 59 55 51 48 44 40 36 31 25 15
1-15	85 75 69 64 60 57 53 50 47 43 40 36 31 25 15

All of the ratings have been transmuted and the scores are combined and the Average (64.00) and Standard Deviation (18.97) were also calculated (see table-D2-T2). The range of the scores was between 15 and 85. The same calculation procedure was used for the rest of items included in the definition of creative thinking.

Table-D2.T2 Imagination item score, and its Mean and Standard deviation

Teacher Number	Max. ranks given by the teacher	Rank given	Score	Teacher Number	Max. ranks given by the teacher	Rank given	Score
1	1 - 12	1	83	10	1 - 15	1	85
2	1 - 15	12	36	11	1 - 15	3	69
3	1 - 15	7	53	12	1 - 15	2	75
4	1 - 15	8	50	13	1 - 15	1	85
5	1 - 15	3	69	14	1 - 15	3	69
6	1 - 15	5	60	15	1 - 15	3	69
7	1 - 15	2	75	16	1 - 15	15	15
8	1 - 15	1	85	17	1 - 5	3	50
9	1 - 15	5	60				
Mean = 64.00				SD =18.97			

Appendix-E1

Table-E1-T1: Principal Component Analysis and Factors extracted from Varimax rotation of Qno.6 (Part-D) of Teachers Questionnaire (TQ)

Principal Component Analysis of TQ				Rotated Factor matrix of TQ		
Factors	Eigenvalue	Percent of variance	Cumulative percent	Factors Labelled	Items	Factor loading
I	4.75	29.7	29.7	I Teaching for self-reliance	Q12 Q13 Q11 Q15 Q14	.87 .77 .61 .59 .58
II	1.84	11.5	41.2	II Responsive	Q8 Q9 Q10	.76 .68 .66
III	1.69	10.6	51.8	III Question-Expanded thinking	Q6 Q7 Q5	.83 .69 .67
IV	1.27	8.0	59.8	IV Building confidence and relations	Q2 Q16 Q3	.85 .63 .62
V	1.14	7.1	66.9	V Supportive environment	Q4 Q1	.82 .76

Table-E1-T2: Principal Component Analysis and Factors extracted from Varimax rotation of Qno.7 (Part-D) of Teachers Questionnaire (TQ)

Principal Component Analysis of TQ				Rotated Factor matrix of TQ		
Factors	Eigenvalue	Percent of variance	Cumulative percent	Factors Labelled	Items	Factor loading
I	4.33	39.4	39.4	I Lack of facilities	Q1 Q3 Q4 Q2 Q8	.82 .75 .74 .66 .63
II	1.75	15.9	55.3	II Inadequate freedom	Q9 Q10 Q11	.85 .84 .83
III	1.25	11.4	66.7	III Lack of support	Q6 Q7 Q5	.88 .87 .43

Table-E1-T3: Principal Component Analysis and Factors extracted from Varimax rotation of Qno.8 (Part-D) of Teachers Questionnaire (TQ)

Principal Component Analysis of TQ				Rotated Factor matrix of TQ		
Factors	Eigenvalue	Percent of variance	Cumulative percent	Factors Labelled	Items	Factor loading
I	2.69	38.4	38.4	I. Unmotivated and lack of confidence	Q5 Q7 Q4 Q6	.80 .78 .72 .54
II	1.31	18.7	57.1	II. Passive and unequal abilities	Q1 Q3 Q2	.88 .73 .51

Table-E1-T4: Principal Component Analysis and Factors extracted from Varimax rotation of Qno.9 (Part-D) of Teachers Questionnaire (TQ)

Principal Component Analysis of TQ				Rotated Factor matrix of TQ		
Factors	Eigenvalue	Percent of variance	Cumulative percent	Factors Labelled	Items	Factor loading
I	4.22	42.2	42.2	I Lack of recognition and stress	Q8 Q9 Q4 Q5 Q10	.84 .83 .72 .72 .66
II	2.09	20.9	63.1	II Lack of knowledge of creativity	Q1 Q2 Q3	.89 .83 .72
III	1.13	11.3	74.4	III Lack of experience and confidence	Q6 Q7	.88 .88

Table-E1-T5: Principal Component Analysis and Factors extracted from Varimax rotation of Part-E of Teachers Questionnaire

Principal Component Analysis of TQ				Rotated Factor matrix of TQ		
Factors	Eigenvalue	Percent of variance	Cumulative percent	Factors Labelled	Items	Factor loading
I	5.32	33.2	33.2	I Permissive and stimulating	E12 E8 E5 E6 E7 E15 E4	.74 .70 .69 .67 .63 .58 .55
II	1.68	10.5	43.7	II Exposing to different activities	E10 E3 E2 E1 E11	.77 .70 .66 .53 .51
III	1.40	8.7	52.5	III. Creative teacher and his methods of teaching	E16 E13 E14	.82 .68 .59
IV	1.21	7.6	60.1	IV. 'Authoritative'.	E9	-.87

Table-E1-T6: Principal Component Analysis and Factors extracted from Varimax rotation of Part-F of Teachers Questionnaire

Principal Component Analysis of TQ				Rotated Factor matrix of TQ		
Factors	Eigenvalue	Percent of variance	Cumulative percent	Factors Labelled	Items	Factor loading
I	2.83	47.1	47.1	I Scope for creativity in curriculum	F1 F3 F2 F6 F4	.82 .80 .77 .68 .62
II	1.05	17.6	64.7	II Suitability of curriculum	F5	.89

Appendix-E2

Table-E2-T1 : The reasons given by the high , average and low creative groups for their liking subjects

The reasons given by the high and low creative groups for liking subjects :**English**	Level of Creative thinking			Total
	High	Average	Low	
	f %	f %	f %	f %
3. 1 Talking look very nice	-	2 (1.6)	1 (3.0)	3 (1.6)
3. 2 Talking with elders, principal, teachers	-	4 (3.3)	-	4 (2.1)
3. 3 New words usage	3 (8.1)	-	-	3 (1.6)
3. 4 It is full of grammar	1 (2.7)	11 (9.0)	2 (6.1)	14 (7.3)
3. 5 It has very interesting stories	2 (5.4)	14 (11.5)	4 (12.1)	20 (10.4)
3. 6 Able to speak	2 (5.4)	6 (4.9)	2 (6.1)	10 (5.2)
3. 7 International language	4 (10.8)	4 (3.3)	-	8 (4.2)
3. 8 Interesting poetry	1 (2.7)	1 (0.8)	1 (3.0)	3 (1.6)
3. 9 Polite language	-	5 (4.1)	4 (12.1)	9 (4.7)
3.10 Introduced by the British	2 (5.4)	1 (0.1)	-	3 (1.6)
3.11 Medium of instruction	-	2 (1.6)	1 (3.0)	3 (1.6)
3.12 To visit foreign countries	2 (5.4)	4 (3.3)	2 (6.1)	8 (4.2)
3.13 Able to read	-	4 (3.3)	1 (3.0)	5 (2.6)
3.14 Able to write	-	2 (1.6)	1 (3.0)	3 (1.6)
3.15 Easy to learn	2 (5.4)	5 (4.1)	1 (3.0)	8 (4.2)
3.16 Subject lessons are easy to understand	6 (16.2)	12 (9.8)	7 (21.2)	25 (13.0)
3.17 Teacher teaches interestingly	9 (24.3)	38 (31.2)	5 (15.2)	52 (27.1)
3.18 Childhood ambition to learn it.	1 (2.7)	2 (1.6)	1 (3.0)	4 (2.1)
3.19 To get good marks	-	1 (0.8)	-	1 (0.5)
3.20 Taught at home and every body like at home	-	1 (0.8)	-	1 (0.5)
3.21 Helpful in higher education	1 (2.7)	-	-	1 (0.5)
3.22 Use in future life / daily life	1 (2.7)	1 (0.8)	-	2 (1.0)
3.23 Develop General Knowledge	-	2 (0.8)	-	2 (1.0)
Total Valid cases	37 (100)	122 (100)	33 (100)	192 (100)

Note: The percentages within those brackets were calculated on the basis of column totals

Table-E2-T2 : The reasons given by the high-creative group for their liking subjects

The reasons given by the High creative group for liking subject: **Science**	f %	The reasons given by the High creative group for liking subject: **Maths**	f %
5.1 Experiments and discoveries	6 (20.7)	4.1 To know the geometry	1 (3.7)
5.2 To know about living beings	4 (13.8)	4.2 To become Engineer	1 (3.7)
5.3 To become a doctor	6 (20.7)	4.3 To know the Accounts/ Expenditures	1 (3.7)
5.4 To know the liquids, solids and gases	1 (3.4)	4.4 It is full of fun	2 (7.4)
5.5 To understand nature / environment	3 (10.3)	4.5 It is queen of all subjects	1 (3.7)
5.6 To open the new doors to the new knowledge	2 (6.9)	4.6 Able to solve the problems	1 (3.7)
		4.7 Solutions to the problems give enjoyment / create interest/ enthusiasm	5 (18.5)
5.7 Easy to learn	1 (3.4)		
5.8 Subject lessons are easy to understand	1 (3.4)	4.8 Helpful in business	1 (3.7)
5.9 Teacher teaches interestingly	2 (6.9)	4.9 Easy to learn	3 (11.1)
5.10 Use in future life / daily life	1 (3.4)	4.10 Subject lessons are easy to understand	5 (18.5)
5.11 To know the history of scientists and his inventions	2 (6.9)	4.11 Teacher teaches interestingly	2 (7.4)
		4.12 Like from childhood	1 (3.7)
		4.13 Use in future life / daily life	1 (3.7)
		4.14 Full of formulas and symbols	2 (7.4)
Total Multiple responses	29 (100)	Total Multiple responses	27 (100)

Note: The percentages within those brackets were calculated on the basis of column totals

Table-E2-T3 : The reasons given by the **low-creative group** for their liking subjects

Reasons given by the Low- creative group for liking subject: **Hindi**	f %	Reasons given by the Low-creative group for liking subject: **Telugu**	f %
2.1 Mother tongue/ Communicative language	6 (21.4)	1.1 Mother tongue/ Communicative language	11 (36.7)
2.2 It has very interesting stories	2 (7.1)	1.2 It has very interesting stories	2 (6.7)
2.3 National language	1 (3.6)	1.3 Interesting poetry	4 (13.3)
2.4 Able to read	2 (7.1)	1.4 Sanskrit words in it	1 (3.3)
2.5 Easy to learn	5 (17.9)	1.5 Able to read	4 (13.3)
2.6 Subject lessons are easy to understand	6 (21.4)	1.6 Able to write	-
2.7 Teacher teaches interestingly	5 (17.9)	1.7 Easy to learn	1 (3.3)
2.8 Like from childhood	1 (3.6)	1.8 Subject lessons are easy to understand	4 (13.3)
		1.9 Teacher teaches interestingly	2 (6.7)
		1.10 Like from childhood	1 (3.3)
Total Multiple responses	28 (100)	Total Multiple responses	30 (100)

Note: The percentages within those brackets were calculated on the basis of column totals

Table-E2-T4 : The reasons given by the **high , average and low creative groups** for their disliking subjects

Reasons given by the students for disliking subjects : **Social Studies**	Level of Creative thinking			Total
	High	Average	Low	
	f %	f %	f %	f %
6.1 Difficult in remembering years	2 (7.4)	3 (3.3)	2 (11.8)	7 (5.2)
6.2 Geography	1 (3.7)	2 (2.2)	-	3 (2.2)
6.3 Do not like politics	3 (11.1)	4 (4.4)	-	7 (5.2)
6.4 Do not like history	4 (14.8)	14 (14.4)	-	18 (13.3)
6.5 Hard to learn	2 (7.4)	11 (12.1)	1 (5.9)	14 (10.4)
6.6 Difficult subject	-	2 (2.2)	1 (5.9)	3 (2.2)
6.7 Boring subjects	4 (14.8)	12 (13.2)	3 (17.6)	19 (14.1)
6.8 No interest in subject	5 (18.5)	14 (15.4)	3 (17.6)	22 (16.3)
6.9 No stories in the subject	-	1 (1.1)	1 (5.9)	2 (1.5)
6.10 Difficult to remember the formulas	-	2 (2.2)	1 (5.9)	3 (2.2)
6.11 Full book is about maps	-	1 (1.1)	-	1 (0.7)
6.12 Lengthy answers	1 (3.7)	5 (5.5)	1 (5.9)	7 (5.2)
6.13 Dislike from childhood	1 (3.7)	1 (1.1)	-	2 (1.5)
6.14 Can't understand the subject	1 (3.7)	9 (9.9)	1 (5.9)	11 (8.1)
6.15 Teachers are not teaching well	3 (11.1)	5 (5.5)	1 (5.9)	9 (6.7)
6.16 Getting less marks in the examinations	-	-	1 (5.9)	1 (0.7)
6.17 Teachers don't take classes regularly	-	3 (3.3)	1 (5.9)	4 (3.0)
6.18 Not important subject nowadays	-	1 (1.1)	-	1 (0.7)
6.19 Too much syllabus	-	1 (1.1)	-	1 (0.7)
Total Valid cases	27 (100)	91 (100)	17 (100)	135 (100)

Note: The percentages within those brackets were calculated on the basis of column totals

Table-E2-T5 : The reasons given by the **high-creative group** for their disliking subjects

Reasons given by the High creative group for liking subject: **Hindi**	f %	Reasons given by the High creative group for liking subject: **Telugu**	f %
2.1 Problem of speaking	1 (3.7)	1.1 Problem of reading	1 (3.8)
2.2 Problem of reading	4 (14.8)	1.2 problem of writing	2 (7.7)
2.3 problem of writing	1 (3.7)	1.3 So much grammar	3 (11.5)
2.4 So much grammar	1 (3.7)	1.4 Dislike poetry	6 (23.1)
2.5 It is not mother tongue	3 (11.1)	1.5 It is not mother tongue	1 (3.8)
2.6 Boring subject	2 (7.4)	1.6 A lack of interest in knowing the language.	2 (7.7)
2.7 No interest in subject	7 (25.9)		
2.8 Can't understand the subject	3 (11.1)	1.7 It is a difficult subject	3 (11.5)
2.9 Getting less marks in the examinations	1 (3.7)	1.8 Boring subject	1 (3.8)
2.10 Teachers don't take classes regularly	1 (3.7)	1.9 No interest in subject	2 (7.7)
2.11 Not important subject nowadays	2 (7.4)	1.10 Can't understand the subject	2 (7.7)
2.12 Not learning any thing new.	1 (3.7)	1.11 Teachers are not teaching well	1 (3.8)
		1.12 Too much homework	1 (3.8)
		1.13 Not important subject nowadays	1 (3.8)
Total Multiple responses	27 (100)	Total Multiple responses	26 (100)

Note: The percentages within those brackets were calculated on the basis of column totals

Table-E2-T6 : The reasons given by the **low-creative group** for their disliking subjects

Reasons given by the Low creative group for liking subject: **Science**	f %	Reasons given by the Low- creative group for liking subject: **Mathematics**	f %
5.1 Sums are difficult	2 (9.1)	4.1 Sums are difficult	3 (14.3)
5.2 Chemical actions and reactions	1 (4.5)	4.2 Unable to solve the problems	1 (4.8)
5.3 Hard to learn	4 (18.2)	4.3 Boring subjects	1 (4.8)
5.4 No interest in subject	4 (18.2)	4.4 No interest in subject	4 (19.1)
5.5 No stories in the subject	1 (4.5)	4.5 No stories in the subject	1 (4.8)
5.6 Dislike from childhood	1 (4.5)	4.6 Can't understand the subject	7 (33.3)
5.7 Can't understand the subject	6 (27.5)	4.7 Teachers are not teaching well	3 (14.3)
5.8 Teachers are not teaching well	2 (9.1)	4.8 Teachers don't take classes regularly	1 (4.8)
5.9 Teachers don't take classes regularly	1 (4.5)		
Total Multiple responses	22 (100)		21 (100)

Note: The percentages within those brackets were calculated on the basis of column totals

Table-E2-T7 : The reasons given by the **high, average and low creative groups** for their liking future occupational choices

The reasons given by the High and low creative groups for liking Job **:Doctor**	Level of Creative thinking			Total
	High f %	Average f %	Low f %	f %
7.1.1 To treat poor patients	16 (42.1)	72 (50.3)	17 (60.7)	105 (50.2)
7.1.2 Serve poor people	14 (36.8)	58 (40.6)	8 (28.6)	80 (38.3)
7.1.3 Defend the nation	4 (10.5)	5 (3.5)	-	9 (4.3)
7.1.4 Social Worker	-	1 (0.7)	-	1 (0.5)
7.1.5 A good job for me	1 (2.6)	-	-	1 (0.5)
7.1.6 Respected job for me	-	1 (0.7)	-	1 (0.5)
7.1.7 To earn a lot of money	-	1 (0.7)	-	1 (0.5)
7.1.8 Hard to get jobs in these days	-	-	1 (3.6)	1 (0.5)
7.1.9 Ambition from childhood	2 (5.3)	1 (0.7)	1 (3.6)	4 (1.9)
7.1.10 Parents' ambition	-	3 (2.1)	1 (3.6)	4 (1.9)
7.1.11 I like subjects like Science subjects	1 (2.6)	1 (0.7)	-	2 (1.0)
	38 (100%)	143 (100%)	28 (100 %)	209 (100 %)
The reasons given by the High and low creative groups for liking Job :**Teacher**	High f %	Average f %	Low f %	Total f %
7.2.1 To develop the country	1 (3.0)	-	-	1 (0.6)
7.2.2 To teach the students well	4 (12.1)	9 (7.4)	1 (5.3)	14 (8.1)
7.2.3 Like to teach students	11 (33.3)	58 (47.9)	9 (47.4)	78 (45.1)
7.2.4 To guide the students	6 (18.2)	18 (14.5)	1 (5.3)	25 (14.5)
7.2.5 To educate the illiterate and poor	6 (18.2)	26 (21.5)	7 (36.8)	39 (22.5)
7.2.6 Enjoying being with children	1 (3.0)	5 (4.1)	1 (5.3)	7 (4.0)
7.2.7 Eradication of illiteracy	1 (3.0)	-	-	1 (0.6)
7.2.8 Easy to get this job	1 (3.0)	-	-	1 (0.6)
7.2.9 A good job for me	-	2 (1.7)	-	2 (1.2)
7.2.10 Respected job	-	1 (0.8)	-	1 (0.6)
7.2.11 Necessary for me	-	1 (0.8)	-	1 (0.6)
7.2.12 Unusual job in the world	1 (3.0)	-	-	1 (0.6)
7.2.13 Parents' ambition	1 (3.0)	-	-	1 (0.6)
7.2.14 Liking subjects like Science/ Maths	-	1 (0.8)	-	1 (0.6)
	33 (100 %)	121 (100 %)	19 (100 %)	173 (100 %)
The reasons given by the High and low creative groups for liking Job **:Lawyer**	High f %	Average f %	Low f %	Total f %
7.6.1 Serve poor people	1 (10.0)	6 (15.8)	1 (20.0)	8 (15.1)
7.6.2 To maintain law and order	6 (60.0)	7 (18.4)	-	13 (24.5)
7.6.3 Justice for poor people	2 (20.0)	12 (31.6)	4 (80.0)	18 (34.0)
7.6.4 To punish criminals	1 (10.0)	4 (10.5)	-	5 (9.4)
7.6.5 To argue in the court	-	7 (18.4)	-	7 (13.2)
7.6.6 Respected job	-	1 (2.6)	-	1 (1.9)
7.6.7 Ambition from childhood	-	1 (2.6)	-	1 (1.9)
	10 (100 %)	38 (100 %)	5 (100 %)	53 (100 %)
The reasons given by the High and low creative groups for liking Job **:Police constable**	High f %	Average f %	Low f %	Total f %
3.2.1 Serve poor people	-	4 (12.9)	-	4 (7.8)
3.2.2 Defend the nation	3 (42.9)	8 (25.8)	3 (23.1)	14 (27.5)
3.2.3 To maintain law and order	-	2 (6.5)	2 (15.4)	4 (7.8)
3.2.4 Justice for poor people	-	-	1 (7.7)	1 (2.0)
3.2.5 To punish criminals	1 (14.3)	2 (6.5)	2 (15.4)	5 (9.8)
3.2.6 To catch thieves	3 (42.9)	11 (35.5)	5 (38.5)	19 (37.3)
3.2.7 A good job for me	-	1 (3.2)	-	1 (2.0)
3.2.8 Ambition from childhood	-	2 (6.5)	-	2 (3.9)
3.2.9 Family profession	-	1 (3.2)	-	1 (2.0)
	7 (100 %)	31 (100 %)	13 (100 %)	51 (100 %)
The reasons given by the High and low creative groups for liking Job **:Engineer**	High f %	Average f %	Low f %	Total f %
7.13.1 Serve poor people	-	1 (3.4)	-	1 (2.3)
7.13.2 A good job for me	1 (11.1)	3 (10.3)	1 (20.0)	5 (11.6)
7.13.3 Respected job	-	1 (3.4)	1 (20.0)	2 (4.7)
7.13.4 To earn a lot of money	1 (11.1)	3 (10.3)	1 (20.0)	5 (11.6)
7.13.5 Ambition from childhood	-	2 (6.9)	-	2 (4.7)
7.13.6 Parents' ambition	-	1 (3.4)	-	1 (2.3)
7.13.7 Planing & designing buildings and bridges	5 (55.6)	17 (58.6)	2 (40.0)	24 (55.8)
7.13.8 Liking subjects like Mathematics	2 (22.2)	1 (3.4)	-	3 (7.0)
	9 (100 %)	29 (100 %)	5 (100 %)	43 (100 %)

Note: The percentages within those brackets were calculated on the basis of column totals

Appendix-E3

Table E3-T1: Occupations of parents of government school students (Sample in the present study)

SNO	Occupation	Father Occupation	%	Mother Occupation	%
1	Doctor	4	1.1	-	-
2	Teacher	5	1.3	9	2.4
3	Lawyer	1	.3	-	-
4	Engineer	1	.3	-	-
5	Mechanic	6	1.6	-	-
6	Electrician	3	.8	-	-
7	Technician	4	1.1	-	-
8	Factory Manager	2	.5	-	-
9	Adm.& Executive Officer	2	.5	-	-
10	Accountant	2	.5	-	-
11	Typist	2	.5	-	-
12	Conductor	3	.8	-	-
13	Office messenger	19	5.1	7	1.9
14	Telephone Operator	4	1.1	-	-
15	Clerk	37	9.9	2	.5
16	Business	52	13.9	4	1.1
17	Sales man	3	.8	-	-
18	Agents Insurance/RTA	3	.8	-	-
19	Merchants and Shopkeepers	7	1.9	1	.3
20	Police / Detective	18	4.8	-	-
21	Nurse	5	1.3	4	1.1
22	Watchman and Gate keepers	18	4.8	-	-
23	Postman	1	.3	-	-
24	Fireman	1	.3	-	-
25	Home guards and Security	2	.5	-	-
26	Butler	2	.5	-	-
27	Cooker	2	.5	1	.3
28	Barber	2	.5	-	-
29	Washer man / *Dhobi*	3	.8	-	-
30	Priest	1	.3	-	-
31	Farmer	6	1.6	-	-
32	Fisherman	1	.3	-	-
33	Screen Printing /printing	4	1.1	1	.3
34	Driver	29	7.8	-	-
35	Tailor	17	4.6	16	4.3
36	Carpenter	16	4.3	-	-
37	Plumber	2	.5	-	-
38	Gold smith	2	.5	-	-
39	Contractor	2	.5	-	-
40	Painter	5	1.3	-	-
41	Rickshawpuller	2	.5	-	-
42	Laborer	8	2.1	7	1.9
43	Railway worker	8	2.1	-	-
44	Photographer	1	.3	-	-
45	Factory worker	37	9.9	5	1.3
46	Supervisors and foreman	4	1.1	-	-
47	Dependent	14	3.8	-	-
48	Housewife	-	-	313	83.9
49	Sweeper	-	-	2	.5
50	Agriculture labourers	-	-	1	.3
		373	100	373	100

APPENDIX-E4

Variables coded for the model

1) Sex (X_1): Girls were coded as '0' and boys as '1'.

2) Age (X_2): The students' age was considered in Years (eg. 12, 13, 14 ...)

3) Father Education (X_3): The weights (1 to 7) were given according to their education levels (See Chap.-IX, table-9.8).

4) Mother Education (X_4): The weights (1 to 7) were given according to their education levels (See Chap.-IX, table-9.9)

5) Father Occupation (X_5): The weights (0 to 7) were given according to their education levels (See Chap.-IX, table-9.10)

6) Mother Occupation (X_6): The weights (0 to 7) were given according to their education levels (See Chap.-IX, table-9.11)

7) Father Income (X_7): The weights (0 to 6) were given according to their education levels (See Chap.-IX, table-9.12)

8) Mother Income (X_8): The weights (0 to 4) were given according to their education levels (See Chap.-IX, table-9.13)

9) Medium of Instruction (X_9): Telugu was coded as '0' and English coded as '1'.

10 Type of the school Dummy (Girls-X_{10}) and 11) Type of the school Dummy (Boys-X_{11}): This categorical independent variable has three groups called Girls Schools, Boys Schools and Co-education schools. These three groups were coded by assigning an arbitrary number. For this, the simplest method of creating a dummy variable is to assign 1's to subjects of a group one wish to identify and 0's to all other subjects. The system of 1's and 0's to create dummy vectors for the three groups was followed (see Kerlinger and Pedhazur, 1973,p.105-06; Cohen and Cohen, 1983, p.183-93).

12 Teachers' Encouragement as perceived by students' (X_{12}): The scores obtained from Teacher Encouragement Scale (TES) administered to the pupil.

13. School Activities (X_{13}): '1' is assigned for 'Yes' and '0' for the 'No'. The total scores obtained for the school activities were 11 minimum and 34 is the maximum.

14. Creative thinking ability (Dependent variable-X_{14}): Composite scores for creative thinking were obtained by adding Verbal and Non-verbal Tests of Creative thinking developed by Baqer Mehdi.

Appedix-E5

Wallach and Kogan(1965) examined the inter-relationship between high and low creativity. Their sample of 151 pupils (70 boys and 81 girls: Age 10-11 years old) comprised the entire fifth grade population of a suburban New England Public School system, whose SES was middle-class categories who divided into four groups. The index scores of creativity and intelligence were dichotomized at their median and called "high" if they fell in the upper half of the distribution, "low" if they fell in the lower half (p.58-59).

1. The 'High Creativity- High Intelligence' children could exercise both control and freedom, showing both adult-like and childlike kinds of behaviour.
2. The 'High Creativity-Low Intelligence' group were in angry conflict with themselves and their school environment, and beset by feelings of unworthiness and inadequacy. In a stress-free context, however, they could blossom forth cognitively.
3. The 'Low Creativity-High intelligence' children were found to be 'addicted' to school achievement. Academic failure would be perceived by them as catastrophic, so that they must continually strive for academic excellence in order to avoid the possibility of pain. Such academic excellence was their main goal and interest in life.
4. The 'Low Creativity-Low intelligence' group were basically bewildered; these children engage in various defensive manoeuvres, ranging from useful adaptations such as intensive social activity to regressions such as passivity or psychosomatic symptoms (p.303).

Appendix-E6

Teachers views on governments schools and its drawbacks

It is appropriate to note the views of the Mathematics teachers in the interviews to understand the real situation in the government schools of Andhra Pradesh.

Mainly, I think, both the students and teachers in government schools are responsible for the low performance of the students in creativity tests when compared to private schools. In private schools they have smaller classes and they have the necessary equipment and management is also strict with the teachers. Management will tell teachers to develop creative abilities in the children whereas in the govt. schools, I don't think, the management is so strict with the teachers and the management doesn't have any concern about developing such activities. So the teacher does not show that much interest in a govt. school to develop creativity thinking among the students. Where as a private school teacher although less qualified than a govt. schoolteacher, uses all the techniques he knows and tries to develop creative thinking. Because of the material he has and because of the encouragement he gets from the management. But that is the reverse of what is happening in the govt. school. We don't have proper materials, which are required. Management does not take that much care. As a result the teacher does not show any interest in students developing creativity. One more thing is, in private schools usually the children come from well to do families. They get encouragement from their families. Their parents are well educated, so they just give them the necessary push, which is required to develop creative ideas. But in govt. schools the children are mostly from backward areas, economically. They are not well off. So as a result their mind is not stable. So they can't think in a new way. Always they will be tensed-up. So this is actually one hindrance, which constrains creativity development among the govt school children.

The other Mathematics teacher interviewed expressed similar views regarding the government schools when the researcher explained that private school students perform better in creativity tests.

The intelligence, the creative abilities, natural abilities are distributed irrespective of the economical standard of children. Generally children with low economic status come to govt. schools and with good economic background those children go to private schools. So in private schools, of course, you can generalise and say that in private school these factors are given more importance. The reasons are obvious. The teachers take interest... of course not all. In private schools also all teacher do not ...many of the private schools are there... where in they only encourage learning things by heart and then put it on paper during the exam. So many unhealthy trends are found in private schools also. Well, the comparative studies with private schools might have been conducted, I don't know what cross section has been studied. I have not found that creative thinking could not be developed in govt. schools, that is a wrong notion. Provided the circumstances are good there is no difference between private school students and govt. school students by nature. It is the environment or the teachers, I always being a teacher, I give first importance to teacher. When a student is not up-to the mark, I think that 75% responsibility lies with the teachers, remaining 25% is with others. In my experience, I have found that in govt schools teachers will do their minimum required. Forget about creativity thinking. It is a higher aspect. The fundamental things we are supposed to do, they do not do it. As such there is no difference between innate talents of children. Only thing is we may not be properly trained. Management takes more interest in private schools. The government does not take interest in this type of training. They are concerned about improving results. The government has concern about literacy campaigning and other things but not the fundamental things in schools.

PICTURES

PHOTOGRAPH REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

Picture No. 1(a). .Carrying books is no problem ...We are studying in Indian schools

PHOTOGRAPH REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

Picture No. 1(b). We have found a place for these big heavy bags.... But where is the place for us to write?

PHOTOGRAPH REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

Picture No.2(a) We don't mind how congested is this classroom..... we are in the government school

PHOTOGRAPH REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

Picture No. 2(b) How unlucky we are ! we have no benches to seat and no desks to write

PHOTOGRAPH REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

Picture No. 2(c) How unlucky we are ! we have no benches to sit on and no desks to write on.

PHOTOGRAPH REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

Picture No. 3(a) How lucky we are ! we have at least benches to sit on and desks to write on.

PHOTOGRAPH REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

Picture No. 3(b) How lucky we are ! we have at least benches to sit on and desks to write on.

PHOTOGRAPH REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

Picture No 4(a) No dining room……..this is the ***Verandah*** of our school

PHOTOGRAPH REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

Picture No 4(b) No dining room……this is the ***Verandah*** of our school

PHOTOGRAPH REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

Picture No.5(a) This is our traditional classroom… We are busy taking notes

PHOTOGRAPH REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

Picture No.5(b) This is our traditional classroom... We are listening seriously to the lesson

PHOTOGRAPH REDACTED DUE TO THIRD PARTY RIGHTS OR OTHER LEGAL ISSUES

Picture No.5(c) This our traditional classroom... We are listening seriously to the lesson